The Business Magazine for Makers & Users of Chemicals

Management, Research, Production, Marketing

CHEMICAL INDUSTRIES

Contents

Volume 47 Number 4

OCTOBER, 1940

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Published monthly, except twice in October, and entered as 2nd class matter Dec. 22, 1934, at the Post Office at New Haven, Conn., under the Act of March 3, 1879. Subscription, Domestic, $3 a year; Canadian and foreign, $4. Single copies, 35 cents. 522 Fifth Avenue, New York, N. Y., Murray Hill 2-7888; Chicago: 919 North Michigan Avenue, Whitehall 5842; London: 2 Cockspur Street, S. W. 1, Whitehall 6642 — Donald Hunter.

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The Reader Writes—

A "Discovery" in Mexico

In the February, 1940, issue and under the title "Automotive Chemical Specialties," by Charles L. Glickman (page 196-198) and in connection with a Hydraulic Brake Fluid Formula reference is made to Resin No. 3. Now where can this resin be obtained?

Now let me say a few words about your publication. As a Mexican technician I am glad I have "discovered" your magazine. It is really unique and just the type of technical journal I needed. Among other things I particularly appreciate the Chemical Specialties Section (which includes working formulae for manufacturers) a rather "solitary" feature in technical publications which I sincerely hope you will continue to cultivate.

ALFONSO CORNEJO,
Chemical Engineer
Mexico City, Mexico.

Characteristic DuBois Modesty

I woke this morning to find that I had become famous, since I found a write-up about G. DuBois in CHEMICAL INDUSTRIES. There is one consolation, however, and that is that your journal is so full of "meat" that by the time one gets through reading all the interesting items, such inconsequential matter as one man is quickly forgotten.

G. DUBOIS,
Vice-President,
Monsanto Chemical Company,
St. Louis, Mo.

"C. I." In Class Work

I was very much pleased to see the excellent photograph of Dr. and Mrs. Dorr in the September number. We are very fond of the Dorrs at Rutgers and I would like to have a print of the upper picture. I have in mind getting Dr. and Mrs. Dorr to autograph it and giving it to President Clothier. Your help will be greatly appreciated.

Incidentally I might say you are doing a splendid job with this publication and I find use for it almost every day in my class work.

W. T. REED,
Dean School of Chemistry,
Rutgers University,
New Brunswick, N. J.

Improving Statistical Data

"I find the section giving monthly statistics of considerable interest and I am wondering whether it would be practical if, in addition to giving figures for two months of the current year and two months of last year, you also included to date figures for the current year and last year. This, I suppose, would necessitate a different arrangement of the tables, but I believe it would add to their interest and value."

G. M. NORMAN,
Hercules Powder Co.
Wilmington, Del.

Editorial Note: Dr. Norman's suggestion is an excellent one and we plan to follow it beginning with the January, 1941, issue.

Suggestion Adopted This Issue

In looking through your interesting September issue, it occurred to me that the Personnel section, for example page 305 of the current number, would be improved if names of men were printed in full caps, since this procedure would make them stand out from the text more satisfactorily.

L. W. BASS,
Assistant Director,
Mellon Institute,
Pittsburgh, Pa.

"Shorts" From the Editor's Mail

H. F. Shattuck, Webster Groves, Mo., is very dear to our hearts for he writes, "Reading CHEMICAL INDUSTRIES is 'home work' and a pleasant and profitable 'task'." Another reader, however, likes most features but suggests, "Go easier on Roosevelt in your editorials."

Dr. Milton A. Lesser of Brooklyn suggests "More special production method articles with formulae."

J. B. Rosefield, An-Fo Manufacturing Co., Oakland, Calif., reports, "I read the whole book with interest. Your 'Guide' is very useful, but I would increase the Chemical Specialties Department."

Both Earl W. Nilsson of Beverly Hills, Calif., and P. W. Saunders of Watertown, Mass., suggest greater attention to the plastics field.

To these and other readers who have volunteered suggestions and improvements we are deeply indebted.

CALENDAR OF EVENTS

October

Oct. 11-12, The American Leather Chemists Ass'n., Joint Meeting of Council and A. L. C. A. Committees, Hotel Pennsylvania, New York City.

Oct. 17-18, Tanners' Council of America, Annual Meeting, Palmer House, Chicago, Ill.

Oct. 17-18, American Institute of Mining & Metallurgical Engineers, Petroleum Div. Meeting, Los Angeles, Calif.

Oct. 18-19, American Ass'n. of Textile Chemists & Colorists, General Meeting, Hotel Commodore, New York City.

Oct. 18-19, Drug, Chemical and Allied Trades Section of N. Y. Board of Trade, 5th Annual Meeting and Golf Tournament, Skytop, Pa.

Oct. 21-23, American Institute of Mining & Metallurgical Engineers, Inst. of Metals, Iron & Steel Div., Cleveland, Ohio.

Oct. 21-25, American Society for Metals, National Metal Exposition, Cleveland, Ohio.

Oct. 24-26, American Institute of Mining and Metallurgical Engineers, Petroleum Div., Tulsa, Okla.

Oct. 27-31, Nat'l Elec'l Mfrs. Ass'n., Annual Meeting, Waldorf-Astoria Hotel, New York City.

Oct. 28-30, Association of Official Agricultural Chemists. Inc., 56th Annual Meeting, Washington, D. C.

Oct. 28-30, National Pest Control Ass'n., Annual Convention, Hotel Claypool, Indianapolis, Ind.

Oct. 28-Nov. 1, Federation of Paint and Varnish Production Clubs, Annual Meeting, "Paint Show," Mayflower Hotel, Washington, D. C.

Oct. 30-Nov. 1, National Paint, Varnish & Lacquer Ass'n., Inc., 52nd Annual Meeting, Washington, D. C.

November

Nov. 7-9, American Institute of Mining and Metallurgical Engineers, Coal Div., Birmingham, Ala.

Nov. 7-9, The American Society of Mechanical Engineers, Joint ASME AIME fuels Meeting, Hotel Tutwiler, Birmingham, Ala.

Nov. 11-15, American Bottlers of Carbonated Beverages, (National) A. B. C. B. Convention Exposition, Music Hall, Cincinnati, Ohio.

Nov. 11-15, American Petroleum Institute, Twenty-first Annual Meeting, Stevens Hotel, Chicago, Ill.

Nov. 12, Oil Trades Association of New York, Inc., Annual Banquet, Waldorf-Astoria, New York City.

Nov. 14-15, American Zinc Institute, Inc., The Galvanizers Committee, Fall Meeting, Lord Baltimore Hotel, Baltimore, Md.

Nov. 15, Society of Chemical Industry, New York City.

Nov. 18-20, The National Fertilizer Association, Annual Southern Meeting, Atlanta-Biltmore Hotel, Atlanta, Ga.

December

Dec. 2, Chicago Paint & Varnish Production Club, Electric Club, Civic Opera Building, Chicago.

Dec. 2-4, American Institute of Chemical Engineers, Thirty-third Annual Meeting, New Orleans, La.

Dec. 2-6, American Society of Mechanical Engineers, Annual Meeting, New York City.

Dec. 2-7, Fourteenth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York City.

Dec. 3-5, The American Society of Refrigerating Engineers, 36th Annual Meeting, Hotel Commodore, New York City.

Dec. 4, American Institute of Consulting Engineers, Monthly Luncheon Meeting, City Midday Club, 25 Broad St., New York City.

Dec. 5, Indianapolis Paint, Varnish & Lacquer Ass'n., Columbia Club, Indianapolis, Ind.

Dec. 6, American Chemical Society, Jointly, N. Y. Section in charge, New York City.

Dec. 6, Baltimore Paint & Varnish Production Club, Baltimore, Md.

Dec. 8-10, National Ass'n. of Manufacturers, Annual Convention, Waldorf-Astoria Hotel, New York City.

Dec. 9-10, National Industrial Council, Waldorf-Astoria Hotel, New York City.

Dec. 11, American Standards Association, Annual Meeting, Hotel Astor, New York City.

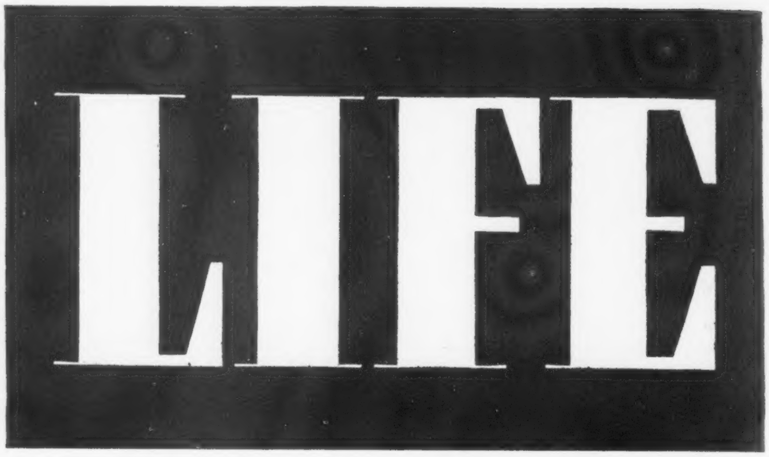
Dec. 11, New Orleans Paint, Varnish & Lacquer Ass'n., New Orleans Athletic Club, New Orleans, La.

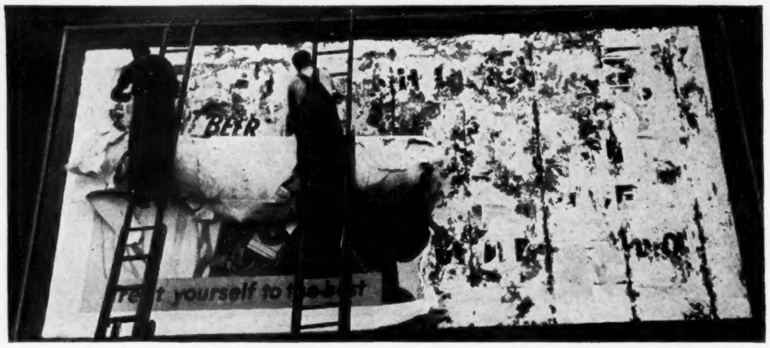
Dec. 11-13, Annual Meeting and Congress of American Industry of the National Association of Manufacturers, Waldorf-Astoria Hotel, New York City.

Dec. 11-15, National Chemical Exposition, Stevens Hotel, Chicago, Ill.

(*Above*) **INK MIXING** calls for constant research to meet present-day requirements. Advances in ink manufacture have been accelerated by Cyanamid's developments in the field of synthetic resins. These resins are made in a wide variety of types to meet individual requirements.

Photo from "Back of the Printed Word," International Printing Ink.





(*Above*) **GOOD NEWS FOR BILLPOSTERS**—an easier, faster way of removing old sheets. Trick lies in the use of AEROSOL** Wetting Agents to promote the moistening of the sheets. Almost every industry has found ways to improve efficiency and economy in manufacture through the use of these wetting agents.

(*Above*) **DOMESTIC PRODUCTION OF THIOUREA** has been initiated by Cyanamid on a commercial scale to supplement its foreign sources of supply of this important chemical. Thiourea produced by Cyanamid equals or exceeds the imported grade in purity and other desirable properties—assures American industry of ample quantities for current requirements and for the new applications that are rapidly being developed—represents another Cyanamid "first". Microphotograph shows crystals of Thiourea.

(*Below*) **BLUEPRINT PAPER** undergoes careful testing to assure desired printing qualities. Essential chemical in manufacture is ferricyanide, now being domestically produced by Cyanamid in the form of REDSOL* Crystals (Potassium Sodium Ferricyanide). REDSOL Crystals free the industry from its dependence on imported Red Prussiate of Potash.

The Result of Careful Cultivation

Factory products—like Nature's products—are dependent for their quality upon the use of good basic materials and care. Many manufacturers—proud of their products, and intent upon achieving finer results—are turning to Niagara Alkali Company as their source of supply for Caustic Soda, Caustic Potash and Carbonate of Potash—because Niagara products are recognized for their dependable uniformity and consistently high quality. If you are seeking finer results, let Niagara meet your requirements for good basic materials.

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60 EAST 42nd STREET, NEW YORK, N. Y.
Affiliated with Electro Bleaching Gas Company, Pioneer Manufacturer of Liquid Chlorine

CAUSTIC SODA
CARBONATE OF POTASH
CAUSTIC POTASH

CHEMICAL INDUSTRIES
The Chemical Business Magazine
Established 1914

Billions Alone Will Not Be Enough

UNFORTUNATELY there appears to be too little real appreciation on the part of a majority of our citizens as yet of the long-range effects of our adoption of a major rearmament policy. No serious objections were launched when Congress appropriated billions for defense for, in the first place, the urgent necessity of putting our house in order has been demonstrated now for months by events abroad and in the Far East, and secondly, because the country has been "educated" for eight years to accept unbalanced budgets caused by billion dollar appropriations, some admittedly necessary, others certainly tinged with the "pork barrel" label. The selective service act was a somewhat different story. This was the first move that actually drove home the true significance of what a preparedness program entails—personal sacrifice on the part of each and every man, woman and child.

This is in no sense a veiled criticism of American patriotism. The life-blood of democracy is the fundamental right of the citizen to be left alone to work out his individual problem in any way he sees fit so long as he respects the rights of others. Citizens of democracies naturally are suspicious and resentful of any appearance of an attempt to regiment or to curtail individual rights, but to successfully meet the present emergency some and indeed many sacrifices will be necessary on the part of capital, labor and government. Abroad France failed to realize quickly enough the truth of this and went down to defeat; England has accepted it wholeheartedly, but only after one tragic development after the other has driven home the necessity of accepting sacrifices in the hope that in the end the democratic way of life may ultimately be preserved.

Many of us here appear so far to be lulled into a false sense of security because billions have been appropriated. Dollars, billions of dollars alone will be of no avail. The present Administration is to be congratulated for asking for these stupendous sums, yet it is tragically failing in its plain duty in not proceeding to establish a real war industries board with a single responsible executive at its head. Most certainly the present Council of National Defense is not in this category. Stettinius, Knudsen and their associates are doing a splendid job under difficult circumstances and could most certainly perform a much more effective job in much less time were they given proper authority. It is difficult not to assume that partisan political expediency alone stops the Administration from making this obviously desirable move.

American enterprise and the American way of life are going to be very seriously disrupted and it is silly for us to emulate the ostrich any longer. Dr. Charles A. Thomas in his address before the American Chemical Society at Detroit last month drove home this point most forcefully and we strongly recommend that you read the digest of his highly pertinent remarks on page 374 of this issue.

Capital will have to be diverted into channels that will be far from attractive based on any normal peacetime yardstick; long-range projects upon which industry has embarked will have to be halted or at best curtailed; labor will have to readjust its attitude on several fronts; in sundry ways the American standard of living is going to be adversely affected because, unless we, as a nation, are to commit financial hara-kiri, our entire tax structure, already close to the confiscation point in too many instances, will have to be increased still further.

Certainly all this is not pleasant nor easy to contemplate, but the sooner we collectively realize that the entire world is in a state of conflagration the sooner we will adjust our thinking and accept as inevitable the sacrifices that we most certainly will be called upon to make.

Fig. 1.
Trona, Searles Lake, Cal. Location of borax refinery.
(Courtesy American Potash & Chemical Corp.)

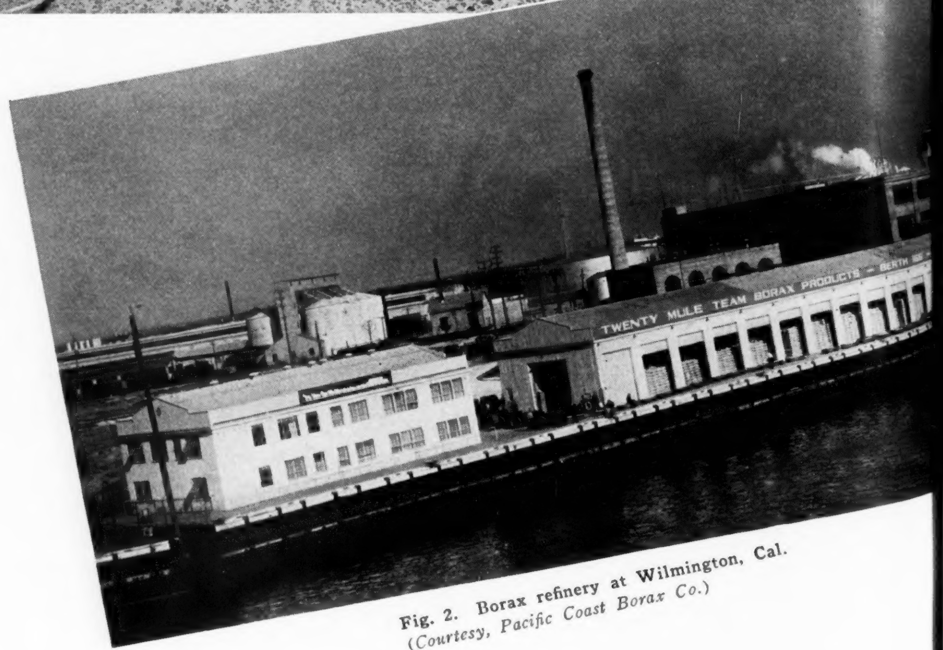


Fig. 2. Borax refinery at Wilmington, Cal.
(Courtesy, Pacific Coast Borax Co.)

BORAX

An Authoritative Survey of the Borax Industry from Its Beginning To Its Future Outlook.

BORAX, $Na_2B_4O_7.10H_2O$, is a white crystalline material, chemically described as Sodium Tetraborate, Dekahydrate. It is soluble in water, slightly alkaline and, from an industrial viewpoint, it is the most important of all boron compounds. The name "BORAX" is said to be derived from an Arabian or Persian Word "BORAK" meaning "white."[1]

The occurrence of crude borate deposits throughout the world is largely restricted to relatively inaccessible areas having climatic conditions of extreme aridity. Hence the development of the Borax industry, particularly in the early days, has been crowded with adventure, hardship and discouragement. The far-off and isolated deposits in Tibet and Asia Minor, the South American deposits, high and remote in the Andes Mountains, where the temperature sometimes falls to —30° C., and the California deposits in the Mojave Desert area with which is associated such names as "Death Valley," "Furnace Creek," "Funeral Mountains" and "Bad Water," have all played a role in the history of Borax production.

Geologically, boron deposits invariably seem to be of volcanic origin. For example, those being currently mined in California are associated with a series of tertiary volcanic and sedimentary beds. Sassolite, natural Boric Acid, occurs in solution or vapors near volcanoes, i.e., in Tuscany, Italy.

The principal natural borates of commercial importance are as follows:

Name	*Composition (Approximate)*	*Principal Deposits*
Tincal (Natural Borax)	$Na_2O.2B_2O_3.10H_2O$	United States, Tibet
Kernite (Rasorite)	$Na_2O.2B_2O_3.4H_2O$	United States
Colemanite	$2CaO.3B_2O_3.5H_2O$	United States
Ulexite (Boronatrocalcite)	$Na_2O.2CaO.5B_2O_3.16H_2O$	United States, Chile, Argentina, Bolivia, Peru
Priceite (Pandermite)	$5CaO.6B_2O_3.9H_2O$	Turkey (Asia Minor)

By R. M. CURTS*, *A.B., A.M.*

[1] Hoefer: "Historie de la Chemie.

* American Potash and Chemical Corporation.

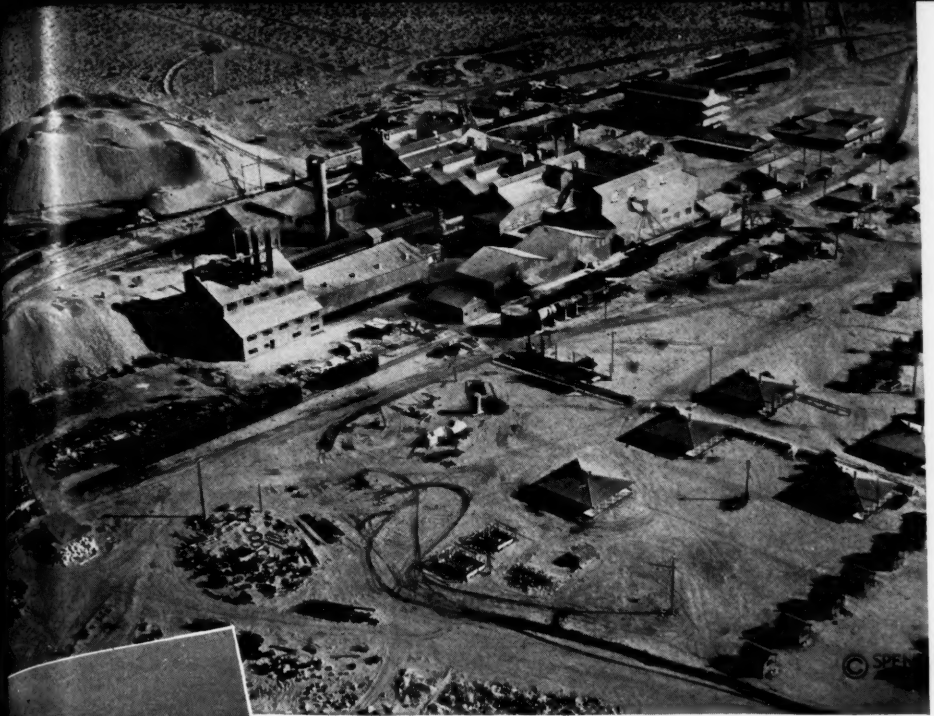


Fig. 3.
Above—Mill at Kramer, Cal., where Kernite ore is mined for shipment to domestic or foreign refineries.

(Courtesy, Pacific Coast Borax Co. Copyright by Spence.)

At one time or another, Borax has been produced from the above borates and, also, from natural Boric Acid (Sassolite, $B_2O_3 3H_2O$) obtained in Italy. Additionally, there are borate containing brines, the most important of which is the brine of Searles Lake, California, which has approximately the following hypothetical composition:—

Sodium Chloride	16.35%
Sodium Sulfate	6.96
Potassium Chloride	4.70
Sodium Carbonate	4.70
Borax	2.84
Miscellaneous	.47
Water	63.98

Currently, the most important of the world's production of Borax is from Kernite (Rasorite) mined in Kern county, California, and from the brine of Searles Lake, San Bernardino county, California. (See figure No. 5). Small quantities of Borax are also intermittently extracted from the brine of Owens Lake, California. Additionally, relatively unimportant amounts of Borax are produced from Boric Acid, in Italy, from Ulexite in South America and from Tincal in Asia —most of this production being essentially for local needs, or for export to nearby markets.

Early History of the Borax Industry

Borax, in crude form, was probably used centuries ago in the refining of metals, soldering, and in the production of vitreous enamels and glazes, i.e., even prior to 1556. Chemically, Borax became better known during the eighteenth century but it was not until after the discovery of substantial deposits of calcium borate in the Death Valley region of California, late in the nineteenth century, that it assumed real importance as an industrial chemical. Although now of no commercial significance, the Tibet (Asia) deposits of Tincal produced Borax as early as 1563 and are thought to be the source of the first borates ever used. These deposits have been worked more or less continuously, reaching a maximum output of about 1,600 tons in 1885 and exports being made through India. The discovery of Boric Acid in Tuscany (Italy) is said to have occurred in 1777. Early attempts to recover it on a commercial scale were unsuccessful but by 1827 production on an economical basis, although not large, was developed by utilizing, for evaporation, the natural steam which emanated together with Boric Acid from the volcanic fissures, i.e., "Soffoni." The mining of Ulexite in Chile commenced in 1852 but it was not until about 1881 that it became of real importance. By this time, the Borax industry in the United States was struggling in its infancy and, although Chilean production of crude borate reached a maximum of about 40,000 tons in 1925, its importance ultimately diminished to insignificant proportions as production in California commenced in earnest. By 1929 Chilean production had declined to about 4,700 short tons whereas United States production of crude and refined had increased from 164,000 tons (1925) to 262,000 tons, plus 11,600 tons of Boric Acid, during the same period. Whereas high cost production in Tibet, Asia Minor, Italy and South America have been important milestones, the early history and development of the Borax industry in the United States is of principal interest in so far as current world production is concerned.

Discovery of Borax in the United States

The first discovery of Borax in the United States seems to have been made by Dr. John A. Veatch in Tehama county, California, during the early part of 1856. In 1859, Borax was discovered in the waters of Borax Lake and Lake Hochenhama, near Clear Lake, California. (See figure No. 5). Production on a commercial scale first started about 1864, which year marks a turning point in the history of the world's Borax industry. Although it was not until the discovery of Colemanite, a number of years later, that the United States production began to eclipse the once important foreign sources into present day obscurity, these early operations, however small, were the beginning of an entirely new era in the Borax industry. From 1864 to 1872, natural Borax crystals (Tincal) were laboriously harvested from the mud surrounding several Borax containing lakes in California—the maximum annual production amounting to 220 tons. These crystals were dissolved in hot water, separated from the insoluble sand, clay, etc., and semi-refined Borax was crystallized from the clear solution by cooling. Then came the discovery of the Teel's Marsh deposit in Nevada, in 1872, which introduced the second phase in the growth of the domestic Borax industry—involving the recovery of Borax and/or Ulexite from the playas and marshes of Nevada and California. Fish Lake, Columbus and Rhodes Marshes in Nevada, the mud flats surrounding Searles Lake, California, and the playa in the bottom of Death Valley (see figure No. 5), were important sources throughout this period—during which production increased to 6,000-7,000 tons per year. From these remote desert-like regions, where only the hardy survived toiling under extreme climatic conditions, crude Borax was transported to distant railroads, or to seaboard, in wagon trains which were hauled by 20 mule teams. Then it was forwarded to the Eastern United States and to Europe for refining. During the summer months, operations practically ceased because of the extreme heat. About 1887, a Colemanite mine

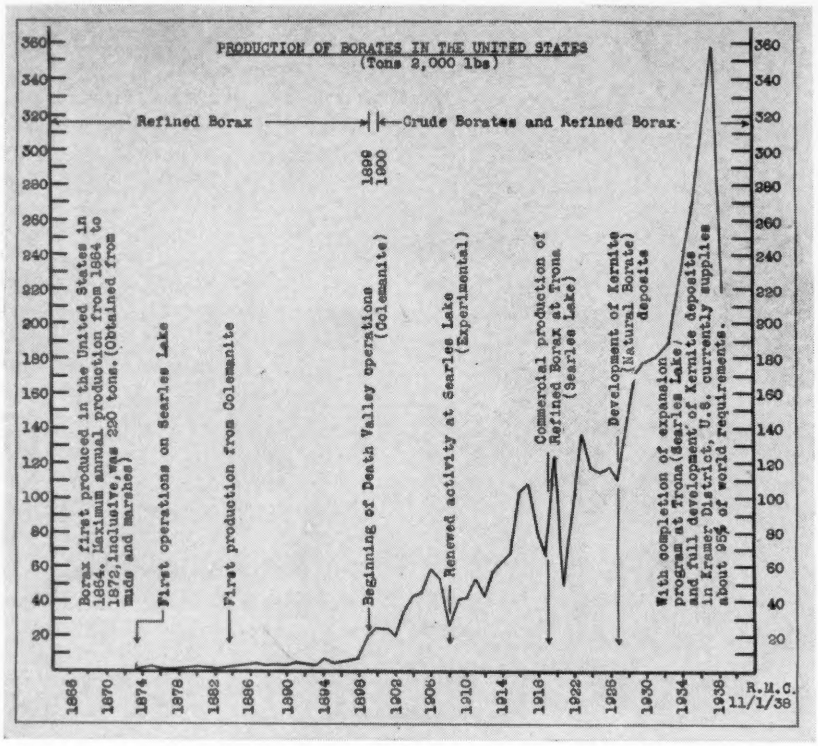


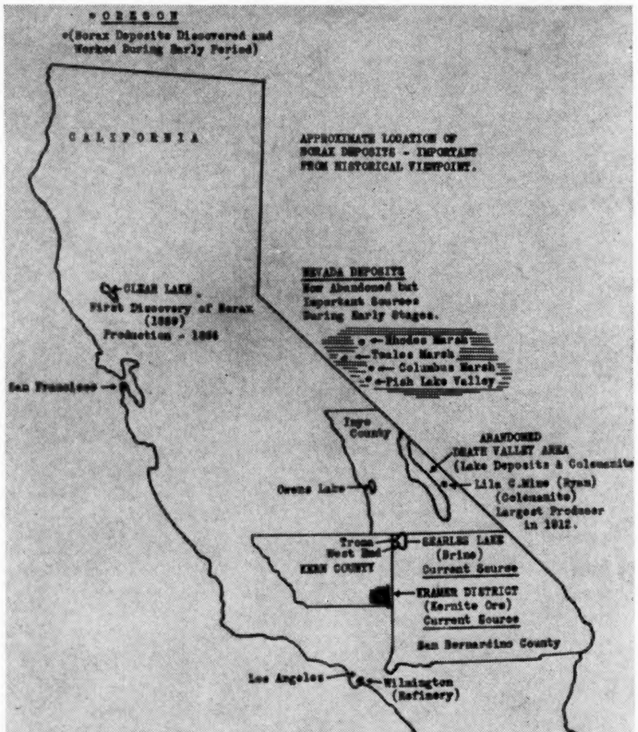
Fig. 4. Estimated production of Borates in the United States from 1864 to 1938.

near Daggett, California, became a relatively important source of Borax and, later, followed the discovery of Colemanite in the mountains east of Death Valley, at Ryan. The opening of the Colemanite deposits shortly signalized the end of one of California's most romantic modes of transportation—the Twenty Mule Team. Colemanite, usually associated with Ulexite, shale, and clay, soon became the principal source of Borax, replacing the laborious and expensive method of extraction from salt marshes, etc. The recovery of Colemanite was strictly a mining proposition. Its discovery, accompanied by a gradual but considerable reduction in production costs, firmly established the American Borax industry. The Lila C mine, a few miles east of the lowest point in Death Valley. (i.e. about 280 feet below sea level) was developed to replace Colemanite operations at Daggett which deposits had been exhausted. In order to economically transport the Colemanite from the new mines at Lila C and Ryan, it was necessary to build an entire new 162-mile broad gauge railroad system—the Tonopah and Tidewater Railroad—which connected with the Santa Fé at Ludlow, California, and the Union Pacific at Crucero, California. In addition, many miles of "baby gauge" and "narrow gauge" track had to be constructed to bring the Borate Ore from the mines to the Tonopah and Tidewater rail point at Death Valley Junction. Despite its proximity to the previously important deposits of Borax, i.e. on the floor of Death Valley, the elevation at Ryan is about 2,500 feet. Notwithstanding, operations here were usually shut down during summer months due to excessive heat. As mined, Colemanite ore was usually separated by hand, the best grade being shipped and the remainder crushed and calcined in a rotary kiln in which it decrepitated into a white powder which could be separated from contaminating shale, etc., by screening. By 1907, Colemanite production amounted to almost 53,000 tons. The treated ore, containing about 40% B_2O_3, was shipped to Bayonne, New Jersey, and to Alameda, Calif. for refining, In 1924 a new refinery was completed at Wilmington, Calif., and subsequently was enlarged during 1930-31. Until about 1928 Colemanite concentrates were shipped to this point for conversion into Borax. Briefly, the refining process consisted of reaction of the calcined borate ore with Sodium Carbonate and Sodium Bicarbonate in solution. The resulting insoluble Calcium Carbonate was separated from the soluble Sodium Borate (Borax) by decantation or filtration and the latter salt subsequently recovered by evaporation and crystallization. By 1923, the domestic production of borate, principally from Colemanite ore, amounted to over 130,000 tons yearly, including the increasing production of refined Borax from the Searles Lake brine, which operation was re-established with renewed vigor in 1919.

Current Production of Borax in the United States

Despite other sources of borates throughout the world, the Borax industry today is centered in Southern California where the brine of Searles Lake and the abundance of Kernite (Rasorite) ore furnished ample supplies of raw material for the needs of a large and constantly increasing demand. Currently, the refineries of the American Potash & Chemical Corporation at Trona (Searles Lake) California (see figures Nos. 1, 10 and 12) and the Pacific Coast Borax Company at Wilmington, California (see figure No. 2) are the largest in the world. Additionally, the West End Chemical Company (Searles Lake) and the Pacific

Fig. 5. Outline map of California showing approximate locations of various Borate deposits.



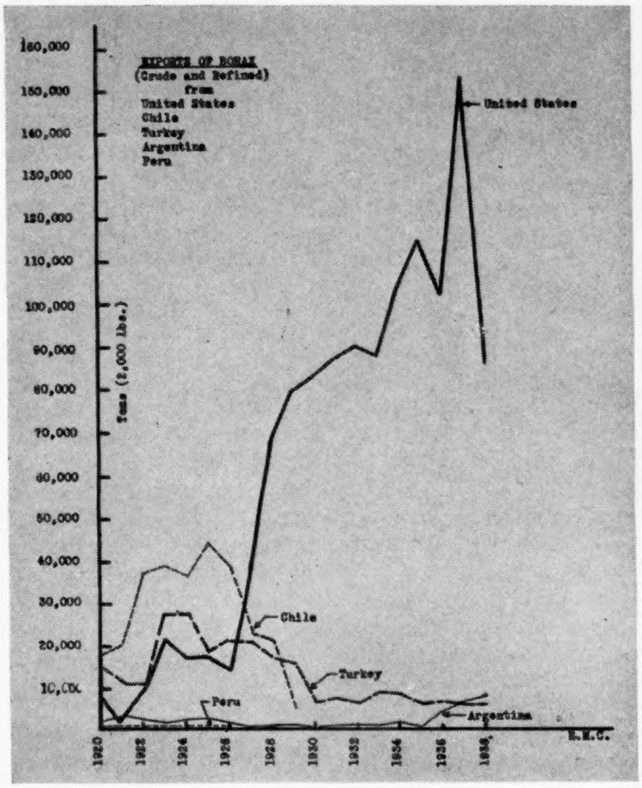


Fig. 6. Estimated exports of crude and refined borax from principal producing countries from 1920 to 1937.

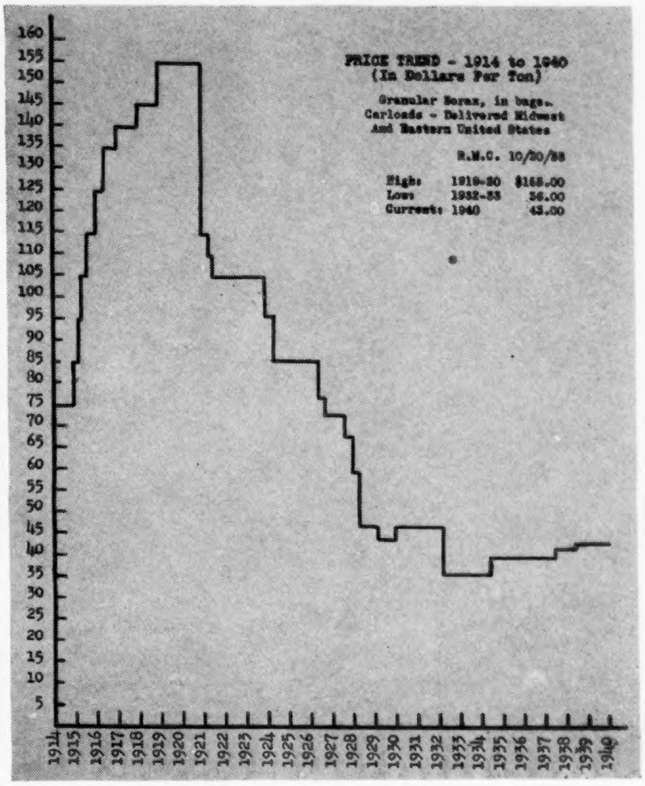


Fig. 7. Price trends of refined granular borax for the years from 1914 to 1939.

Alkali Company (Owens Lake) also produce Borax—the latter operating intermittently. The uninterrupted extraction of Borax from the brine of Searles Lake, since 1919, and the later discovery and development of large Kernite deposits in Kern County, during 1926, constitute the beginning of the modern phase of the Borax industry in the United States.

Searles Lake is located in the northern part of the Mojave Desert, about 185 miles northeast of Los Angeles (see figure No. 5). It is roughly circular and extends over an area of approximately 12 square miles. The deposit consists of a porous crystalline mass, permeated by a dense alkaline brine—the level of which is below the surface of the salt body for the greater part of the year. Although the presence of Borax in the Searles Lake brine was noted in the early 1860's and was subsequently exploited from time ot time, it was not until the completion of a large and modern refinery at Trona with a railroad to the main line of the Southern Pacific Railroad, some 31 miles away, that production was undertaken on a scientific and commercial scale. In 1920 this production amounted to 4,643 tons which increased to about 17,500 tons in 1926 and, with further plant expansion in 1929, production exceeded 53,000 tons annually. Currently, this plant is capable of producing about 100,000 tons per year and during 1937 operations were carried on at this rate.

In addition to Borax and Boric Acid, the operation at Trona also involves the production of Muriate and Sulfate of Potash, Soda Ash, Salt Cake, Crude Lithium Salt, Liquid Bromine, Bromides and other chemicals and represents an investment of close to $20,000,000. Brine from Searles Lake is pumped from wells at a level of about 60-70 feet below the surface of the crusty deposit. Crude Borax is separated from other salts by a carefully controlled process of fractional crystallization involving a notable application of physical chemistry and the phase rule. Subsequently, this is refined to the technical grade which is well over 99.5% pure and some of which is converted into Boric Acid by reaction with sulfuric acid, and into Dehydrated Borax ($Na_2B_4O_7$) by partial calcination followed by complete fusion in specially designed furnaces.

The refining of Kernite ore, which is mined in the Kramer district (Kern County), is carried on in a modern refinery located at Wilmington, California. The Kramer ore deposits (see figure No. 4) lie 350 to 800 feet underground and contain Kernite and Borax mixed with considerable clay and shale. The crude ore, containing about 29% B_2O_3, is brought to the surface, is subsequently crushed, calcined and concentrated to remove shale and clay—the concentrated product running about 45% B_2O_3. Conversion into refined Borax is accomplished by dissolution under pressure in hot water, removal of insoluble impurities by filtration and, finally, crystallization of Borax crystals from solution. The Kramer borate deposits not only supply ore for domestic refining but also serve as the principal source of raw material for refineries in foreign countries to which large quantities are shipped annually in the concentrated form. In 1937, the combined production of crude Borax, mostly for export, and refined Borax amounted to an all time high of about 359,000 short tons, representing approximately 94% of total world production in that year. The following year, this figure declined to 219,500 tons but still represented over 90% of world production. (See figures Nos. 4 and 8.)

Grades of Borax

Borax is obtainable in three grades of purity, i.e. technical, U.S.P. and C.P. The technical grade is commonly specified for most industrial uses and is sometimes required to meet special limits with respect to specific impurities. It is guaranteed to be at least 99.5% pure but usually runs closer to 100%. Anhydrous Borax is only available in technical quality and may run slightly higher in impurities which are concentrated rather than removed in the dehydration process.

With regard to physical properties, Borax is available in crystal (lump), coarse granular, fine granular, powdered and impalpable form. In the early days of the industry, the crystal form was quite familiar but, with subsequent speeding up of the crystallization process in the interest of economy, the granular form has become most popular. Coarse gran-

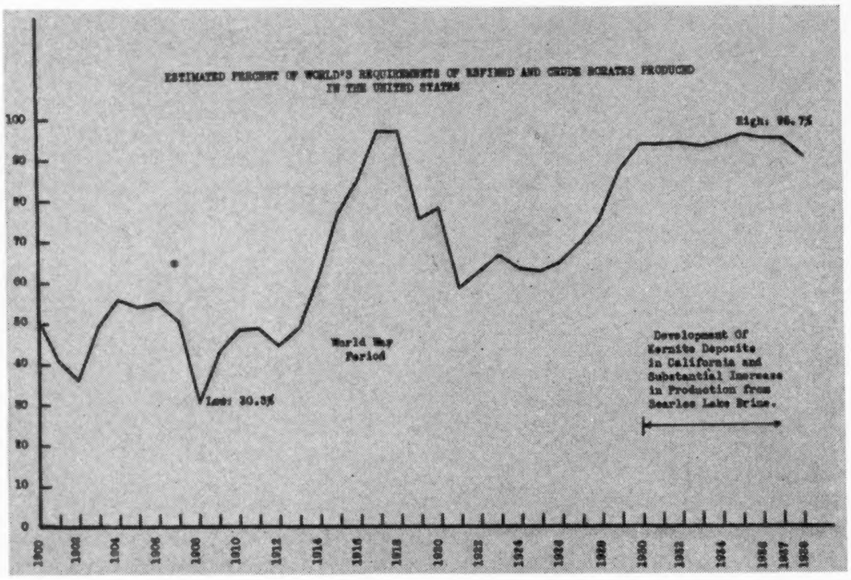


Fig. 8. Estimated per cent. of world's requirements of crude and refined borax produced in the United States from 1900 to 1937.

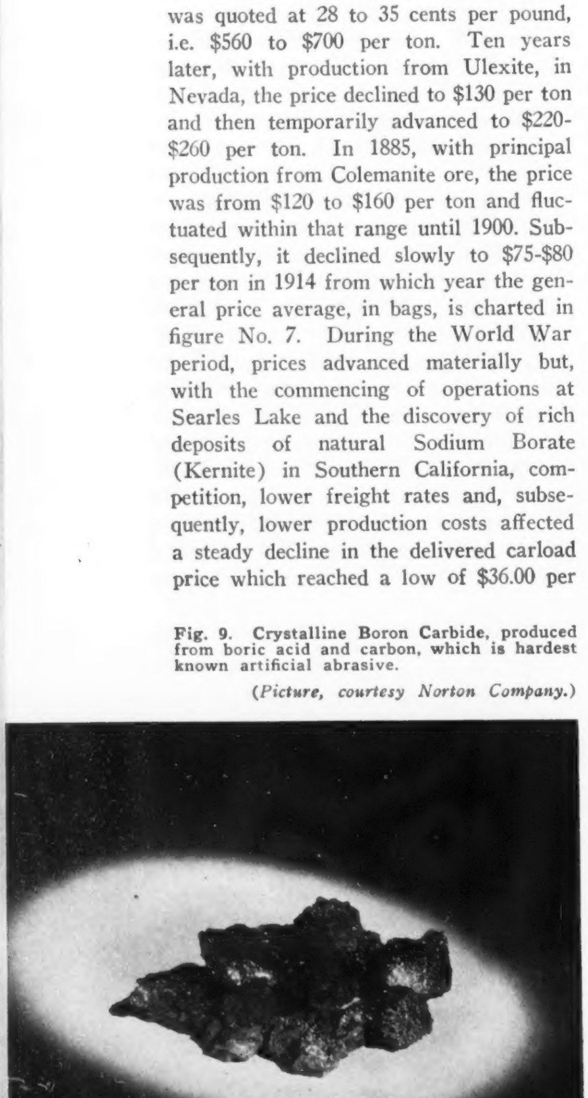
ular Borax will run mostly between 20 and 100 mesh; fine granular between 50 and 100 mesh and powdered less than 10% on 100 mesh. Impalpable grade runs still finer than powdered.

Domestic Prices

In 1864, when Borax was first produced in the United States, the refined product was quoted at 28 to 35 cents per pound, i.e. \$560 to \$700 per ton. Ten years later, with production from Ulexite, in Nevada, the price declined to \$130 per ton and then temporarily advanced to \$220-\$260 per ton. In 1885, with principal production from Colemanite ore, the price was from \$120 to \$160 per ton and fluctuated within that range until 1900. Subsequently, it declined slowly to \$75-\$80 per ton in 1914 from which year the general price average, in bags, is charted in figure No. 7. During the World War period, prices advanced materially but, with the commencing of operations at Searles Lake and the discovery of rich deposits of natural Sodium Borate (Kernite) in Southern California, competition, lower freight rates and, subsequently, lower production costs affected a steady decline in the delivered carload price which reached a low of \$36.00 per ton (\$33.50 per ton, in bulk) in 1932. Subsequently, there has been a slight adjustment upward due to increased cost, i.e. labor and transportation. The current price, 1940, delivered in the Eastern United States, minimum 40 tons carloads is \$43.00 per ton, in bags, and \$40.50 per ton, in bulk.

Fig. 9. Crystalline Boron Carbide, produced from boric acid and carbon, which is hardest known artificial abrasive.

(Picture, courtesy Norton Company.)



Methods of Marketing

The methods of marketing Borax and crude borates are relatively simple. Exports of crude ore and refined Borax and Boric Acid are generally handled by foreign agents and sub-agents appointed directly or indirectly by the domestic producers, and prices in each export country will vary according to transportation costs, exchange, duties, commissions, etc. In many foreign markets, prices are on a pound-Sterling basis. Carload contract sales of refined Borax and Boric Acid in the United States are usually negotiated direct with the producer. Terms to responsible firms are 1% 10 days, 30 days net. Less than carload sales are generally made through distributors who purchase minimum 40 ton cars, warehouse and resell at a schedule which is about 20% higher than the carload price. Currently, contracts are made at a firm price for six months' periods beginning January 1st and July 1st and involve a minimum and maximum quantity for the period specified.

Imports and Duties

During the period 1900-1910 imports of boron minerals ranged from 1,130 tons, in 1907, to 3½ tons in 1910. The duty was three cents per pound for ores containing under 36% B_2O_3. During this same period, imports of refined Borax ranged from 93 tons in 1902 to a low of 40 pounds in 1908, the duty being four cents per pound. Despite the fact that, in 1909, the duty on crude borates and refined Borax was reduced to two cents per pound, remaining at this level until 1913, total annual imports declined to less than 10 tons of crude borates and a few tons of refined Borax. In 1913, the Underwood Act cut the duty on refined Borax to ⅛ cent per pound and placed crude boron minerals on a duty-free basis. There has been no change since, and imports of both crude and refined material has been insignificant. For example, in 1930, 8 tons of refined Borax were imported. The current duty on Boric Acid is one cent per pound.

Uses of Borax and Allied Compounds

The principal uses of Borax are primarily related to its (1) strong fluxing ability, (2) its mild antiseptic properties and (3) its mild alkaline nature in connection with which it often acts as a buffering agent. Other important boron compounds which are derived from Borax, i.e. Dehydrated (Anhydrous) Borax, Boric Acid, Boron Carbide, Sodium Perborate, Sodium Metaborate, Ammonium Borate, Magnesium Borate, etc., account for an appreciable consumption of Borax and possess specific properties which are indispensable for certain purposes.

Although, from the layman's viewpoint, Borax is probably best known through its use as a mild antiseptic and detergent, the ceramic industry is by far the most important consumer. Well over half of the world's Borax production is utilized in the production of vitreous enamels, glasses and glazes. (See figure No. 13.) The most important ceramic use is in the manufacture of vitreous (porcelain) enamels for kitchen ware, stoves, refrigerators, signs, sanitary ware and numerous other products requiring a durable sanitary finish. The amounts of Borax employed generally range from between 25 to 40% of the enamel batch. The resulting product possesses a relatively low melting point, which provides easy application to the iron or steel base, is tough and durable, and is able to withstand both physical and thermal shocks to which it is normally subjected. Keen competition and research on the part of enamel manufacturers has resulted in substantial improvements in quality and has very markedly broadened the use of vitreous enamels, thus reflecting large increases in the demand for Borax for this purpose.

Glass Industry Is An Important Consumer

During the past ten years, the glass industry has developed into a very important Borax consumer and, at present, despite its wide use in enamels, threatens the first place position of the enamel industry as the principal outlet for Borax. Borax (and Boric Acid) are very essential raw

materials in the production of borosilicate, heat resisting glasses. The well known Pyrex ovenware, essentially a boric oxide and silica glass, contains from 12 to 14% boric oxide derived from the use of Borax and Boric Acid. The Borax and Boric Acid serve as a flux in melting and furnish boric oxide to the glass composition—thus substantially improving its resistance to thermal shock and to chemical attack. Borosilicate glasses are not only highly resistant to thermal shock but they are tough and durable. Although more costly to manufacture than ordinary soda-lime-silica glasses, they find wide use where specific properties are desired—i.e. chemical ware, insulators, building blocks, cooking utensils, etc.

Whereas boric oxide has always been an essential ingredient of borosilicate glasses, the general use of Borax in the production of commercial soda-lime-silica glasses for bottleware and pressed-ware has only become popular during the past decade. Although economic factors limit the use of Borax in these glasses to about 1% B_2O_3, as compared with 12-14% in borosilicate glasses, the quantity of soda-lime-silica glasses produced tremendously exceeds borosilicate glass production and the total amount of Borax consumed in the manufacture thereof is much greater. The development of this relatively new and very important outlet for Borax may be attributed both to extensive research and to lower prices which have prevailed since 1929. Not only does Borax facilitate the melting and refining of commercial soda-lime-silica glasses to an extent which offsets the slightly increased cost of the glass batch, but even in amounts yielding 1% B_2O_3, it substantially improves the quality, i.e. resistance to thermal shock, strength, durability, clarity and brilliance. Borax is also used in the production of special glasses for optical purposes, etc., but the amount consumed is not important.

Used for Glazing

Both Borax and Boric Acid are employed in the production of glazes for chinaware, brick, pottery and tile although the total quantity involved does not approach the consumption of the two other branches of the ceramic industry mentioned above. It is also used as a binding agent in the manufacture of refractories and grinding wheels. Because of its strong fluxing characteristics, it functions unusually well in the production of colored glasses, some of which are finely ground and used as pigments. Another important ceramic use is in the manufacture of colored glazes used to coat silica or clay granules for surfacing of asphalt-felt type shingles.

Perhaps one of the first uses for Borax was as a flux in the refining of gold and silver and, later, in metallurgical processes involved in the production of non-ferrous alloys—particularly copper and nickel. Its powerful solvent action on metallic oxides makes it valuable in brazing, soldering and welding operations.

Because of its mild alkaline nature, Borax is used in the leather industry—particularly in the neutralization of chrome-tanned leathers. It is also used to facilitate the emulsification of oils, fats and water of which fat liquors are composed, and aids in the absorption of the mixture by the leather. Boric Acid is employed in deliming hides and leathers and effects a higher yield of a more durable finished product. In the role of buffering agent, both Borax and Boric Acid find extensive use in the textile industry and other processes where control of hydrogen ion values is beneficial.

An aqueous solution of Borax is very effective as a casein solvent and, due to its antiseptic nature, it acts as a preservative. Important quantities are employed in the manufacture of pastes and glues where its preservative properties are also of considerable value. Borax is also used in connection with the fireproofing of paper, wood and textile products.

Borax As Detergent

As a detergent, Borax is employed extensively in connection with soaps and cleaning compounds. Here, again, its mild antiseptic properties together with its role as a mild alkaline buffering agent and, to some extent, its action as a water softener, provides substantial advantages, and consumption for such purposes is quite large. Particularly in Europe, Sodium Perborate is an important constituent of washing compounds for household use. A well known European product contains soap, soda, sodium silicate and about 9% Sodium Perborate—the latter acting not only as a detergent but, also, as a mild bleaching agent. High gloss laundry starches usually contain a small percentage of Borax but, the consumption of starch being large, this use constitutes an appreciable market.

As a mild antiseptic, Borax is employed extensively in the production of cosmetics, talcum powders, gauze, toilet preparations, salves and ointments. Considerable quantities are sold in one pound packages for general household use. A 5 to 8% solution of Borax is quite commonly used for washing and disinfecting citrus fruits in order to prevent "blue mold" decay. In some countries, it is used in the preserving of meat and fish. Similarly, it has been found effective in the control of sap stain in the lumber industry—the occurrence of which annually de-

Fig. 10.
Portion of Searles Lake, Cal., with Trona in background. Trona is location of borax refinery of American Potash & Chemical Corp.

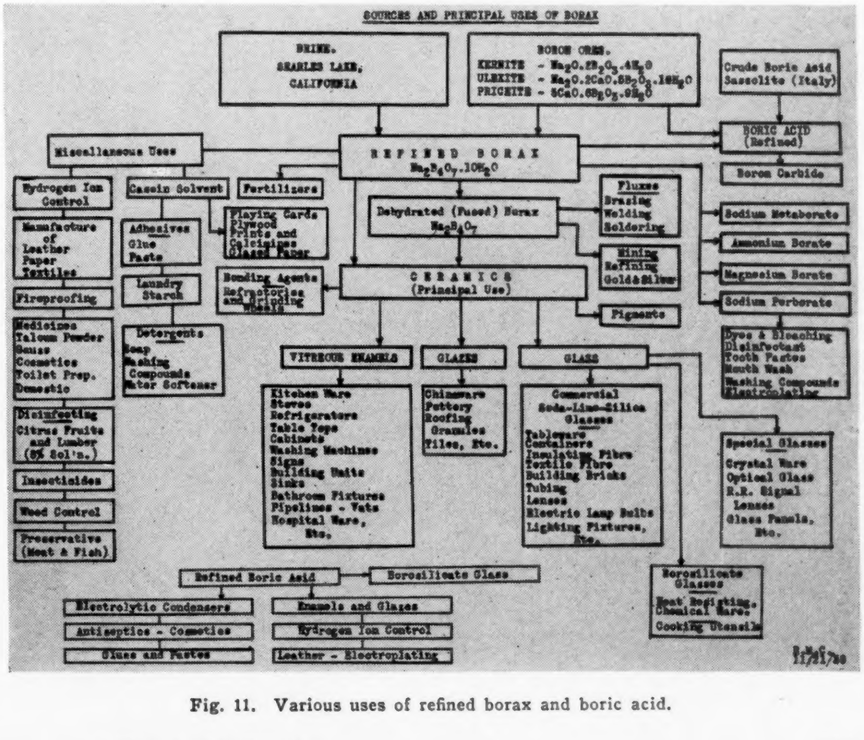


Fig. 11. Various uses of refined borax and boric acid.

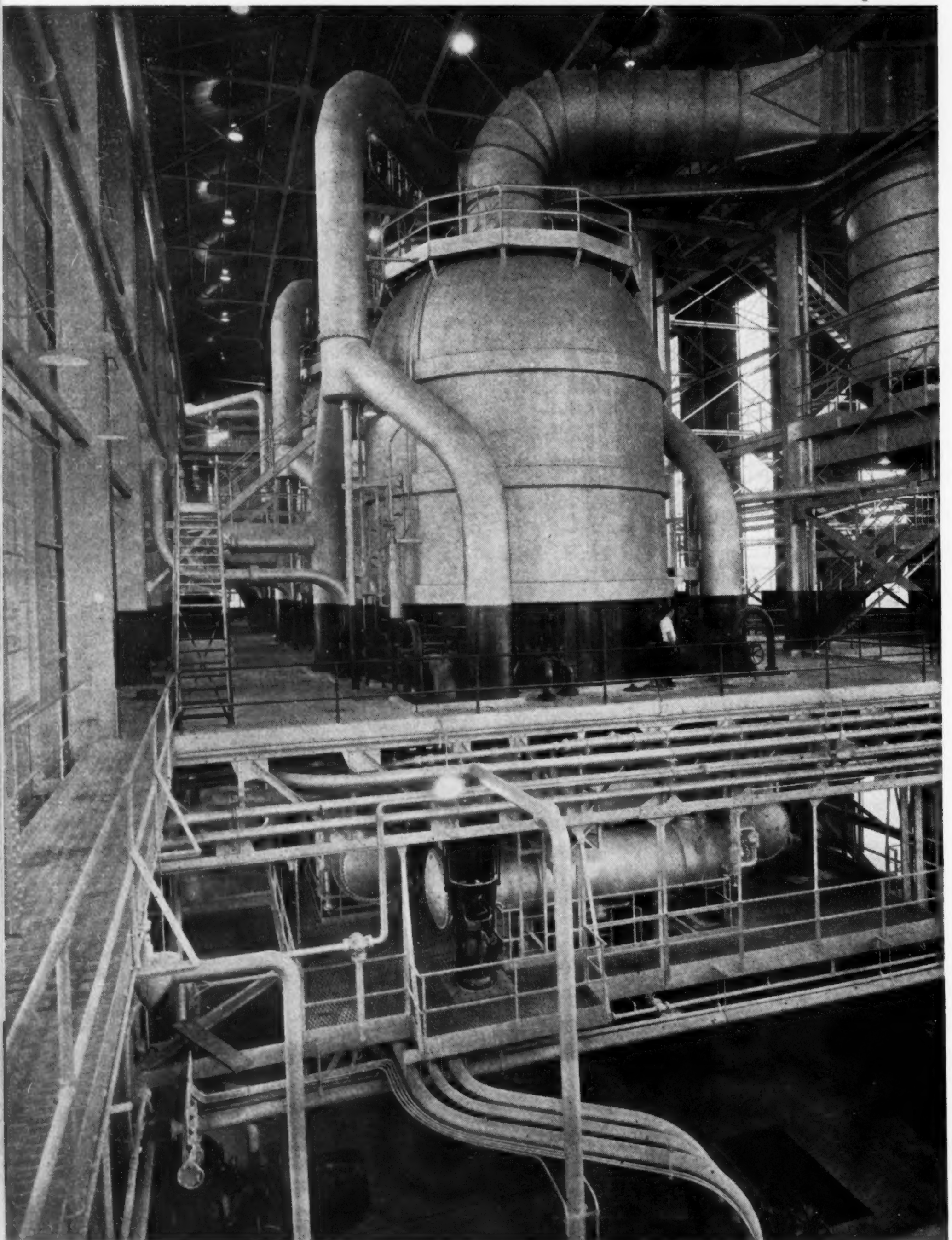
grades millions of feet of lumber. As an insecticide, Borax—either alone or in combination with other chemicals—has proven quite effective.

Boron Carbide

A relatively new and very interesting boron compound, produced indirectly from Borax, is Boron Carbide (B_4C). (See figure No. 9.) In grain or powdered form, it is the hardest manufactured abrasive known, being second only to the diamond in hardness and considerably harder than silicon carbide, previously recognized as second to the diamond. In molded form, Boron Carbide resists abrasion to a greater degree than any other substance, except the diamond, and can be used where an exceedingly hard and smooth surface is required. Additional to the expected development of its uses as an abrasive and wear resistant product, it offers possibilities as an economical source of boron for metallurgical purposes—both as a source of boron for alloys and as a powerful deoxidizing agent.

Borax is employed as a corrosion inhibitor. For example, substantial quantities are used by manufacturers of anti-freeze liquids for aqueous cooling systems. Boric Acid and Ammonium Borate are important ingredients in the construction of electrolytic condensers.

Fig. 12.
Triple effect evaporators in borax refinery of American Potash & Chemical Corp., Trona, Cal.



Borax is often employed to retard or eliminate the growth of weeds. In concentrated form, it is a killer of plant life. Curiously enough, the presence of boron in the soil, in very limited quantities, now appears to be most essential to the health of many forms of plant life. During the past several years, much careful research work has been carried out with regard to boron deficiency of numerous crops, grown in boron deficient soils, and quite probably the inclusion of small amounts of Borax in many commercial fertilizers will become more or less standard practice in the not too distant future. Already the consumption of Borax for this purpose has created a substantial market.

Current World Production and Markets

It is estimated that, during the last ten years (1929 to 1939), the United States produced annually from 90 to 95% of the world's primary borate requirements, the total world production ranging from 192,000 tons in 1932 to 382,000 tons in 1937. (See figure No. 3.) Of this production, the United States consumed almost one-half, in the form of refined Borax and allied boron compounds manufactured therefrom. The remainder was exported either as crude borate or refined Borax and Boric Acid. A small amount of Pandermite (44-47% B_2O_3), i.e. 5,000 to 6,000 tons, is mined in Turkey each year and is shipped to Europe where most of it is converted into Boric Acid. Annually, Italy produces about 6,000 to 7,000 tons of crude Boric Acid, some of which is converted into Borax and refined Boric Acid, mostly for local consumption. Normally, Italy exports some crude Boric Acid, i.e. of 82% purity, to Germany for refining, and also exports small quantities of refined Acid to Great Britain, Switzerland, Belgium and neighboring countries. India, the cradle of the Borax industry, and the principal source of the world's comparatively small requirements in the 18th century, now has a very small production and imports more than it exports. Normally, Argentina produces less than 1,000 tons annually, a large part of which is consumed in its own market. Additionally, during the past several years, special production of crude ore for export has been reported—this increasing total ore production to around 11,000 tons per year. Chile, in 1925, produced 43,000 tons of crude, exported 38,700 tons, but this declined to 4,190 tons exported in 1929 and, at present, production is practically dormant. Peru, likewise a once relatively substantial source, produced only 300 tons in 1928 and subsequently faded

(Photograph, courtesy, Glass Container Association.)

Fig. 13.

Illustration showing various glass and ceramic products in manufacture of which borax and boric acid are employed.

Porcelain enamel: Refrigerators, cabinets, stoves, desks, etc.
Earthenware: Mixing bowls, etc.
Borosilicate glass: Coffee percolator, oven dishes, etc.
Glass containers: Milk bottles, canning jars, etc.
Glass blocks, opaque glass slabs and lighting fixtures.

out. In 1934, deposits of Hydroborite ($CaO.MgO.3B_2O_3.6H_2O$) mixed with clay and gypsum, were reported discovered in Western Kazachstan, Russia, but little is known of their development. It is claimed that some 15,000 tons of borate was produced in Russia during the first six months of 1938 and that, within three years, the annual production was expected to increase to 60,000 tons. It is extremely doubtful if this is true and it is not conceded that, with this type of ore, even considering low labor costs, Russia can compete with the efficient, low cost Californian production, excepting on a barter basis.

Germany and Britain

For the United States, the most important export markets, prior to the current war, were Britain and Germany, both of which countries re-exported substantial quantities to many parts of the world. France, Japan, Belgium, Holland, Canada and Australia are also important customers and with few exceptions American Borax, refined and crude, supplies all foreign markets, both large and small.

Future Outlook of the Domestic Borax Industry

The supply of borates and brine in California appears to be ample for world consumption for many years to come and, with current low production costs and efficient refining methods, the domestic industry should not suffer greatly from potential foreign competition in the future. The second World War, now in progress, has disjointed world trade to a very considerable extent and, along with many other products, has temporarily affected the export market for Borax in an adverse manner. However, when normal conditions return again, and excepting for the possibility of unequitable duties and extended barter methods well known to Germany, which country is an important refiner of crude ores, principally imported from the United States, one can see little cause for concern with regard to the United States continuing its enviable position as the principal source of refined and crude Borax, providing taxes are maintained at a reasonable level.

With regard to consumption, which has so materially increased since Borax has been made available at relatively low prices, constant research will undoubtedly provide increased demands. A good example is the ever increasing use of porcelain enamel for many new purposes—this reflecting a very decided increase in the demand for Borax.

The growing popularity of glass building blocks and glass fiber, both relatively new products, will likewise increase the market for Borax. The use of boron in agriculture, now well established but still in its infancy, is expected to provide a substantial outlet for Borax in the future. Undoubtedly, additional important uses will be developed based on its unusual mild alkaline, antiseptic and fluxing properties.

NOTE:

Statistics used were obtained from various sources, principally from the following:—

(1) Mineral Resources of the U. S., Part II, (Annual).

(2) Preliminary Summary of the Mineral Products of the U. S. (Annual).

(3) Minerals Yearbook (Annual) Bureau of Mines.

(4) The Mineral Industries of the British Empire and Foreign Countries (Annual).

(5) The Annual Report of the Mineral Resources of the U. S. S. R., 1926 and 1927.

While the author questions the reliability of some statistics from the above sources, and is also aware that a common basis of reporting production, exports, etc., has not prevailed over a period of years, he believes that the general trends indicated are quite acceptable for the purpose of following the industry's development. It must be realized, of course, that the current World War has temporarily, and very considerably, disjointed normal world trade in Borax. However, with the return of peaceful conditions, it is expected that the Borax industry will carry on from its status as of September 1939.

CHEMISTS IN DEFENSE

Resources, Manpower, and Technical Facilities of the Chemical Industry Were Discussed in the Light of National Defense at the A.C.S. Detroit Meeting. In This Article Pertinent Papers Are Digested To Give You a Time Saving Review of One of The Society's Most Important Meetings.

Highlights Of The A. C. S. Detroit Meeting

By WALTER J. MURPHY, Editor of "Chemical Industries"

NATIONAL Defense and the progress in the development of synthetic materials vitally necessary to this country in the event of war keynoted the 100th Meeting of the American Chemical Society, held in Detroit last month and attended by over 4,200 leading chemists of the nation.

A solemn note of warning was given to the assembled chemists by Dr. Charles A. Thomas, director of research of Monsanto, when he pointed out in his address "Our Chemical Self-Sufficiency" that although by virtue of an abundance of raw materials, more than adequate supply of power, and capable personnel, the chemical industry of today is one of America's best national defenses, nevertheless it is to peace-time development that American chemical industry is geared.

"We are engaged," Dr. Thomas pointed out, "in a closely knit program which involves research, development, and manufacture of chemicals for supplying normal demands. The last ten years have advanced a challenge to the chemical industry which has been ably met. Through steady effort directed at producing constantly better products at constantly lower prices we have established entirely satisfactory markets. The advent of war would have a definitely disruptive effect on our present chemical economy.

"Plants and men which are now being used to fill orders for materials which it has taken us years to develop will have to be diverted to the manufacture of munitions. Long-range research projects upon which we are embarked will have to be halted in order to release chemists and facilities for military purposes. New plants will have to be constructed for the manufacture of certain chemicals for which there is an excessive demand in war time.

"Then, when the turbulent days of war are over, we will again have with us a difficult and costly period of reconstruction. Old markets will need to be recaptured and the threads of old researches may have to be cumbersomely picked up by inexperienced workers. Plants which had been hurriedly constructed to meet military demand for chemicals will have to go idle. The chemical industry, pros-

Top to bottom—Irving Langmuir, General Electric, takes time out on the steps of the Masonic Temple to make a point clear; Prof. Hal. W. Moseley, Tulane; Ogden Fitzsimons, president, Floridin Co.; Lynn A. Watt, assistant vice-president, Monsanto; Harold A. Levey, New Orleans consultant; Per K. Frolich, Esso Laboratories; M. L. Crossley, Calco; Thomas Midgley, Jr., Ethyl Gasoline; H. Y. De Schepper, R. W. Greeff & Co.

perous and working at full capacity, has no desire for war. We would like to be able to go on as we have been doing, expanding permanently in a logical and unhurried manner. The chemical industry does not want its progress interrupted by military demands; but what we want and what we may get are two different things. At this time we would be very short sighted and very unpatriotic if we did not take stock of our chemical self-sufficiency.

"We are especially strong in organic chemicals, for this field is built primarily on our most abundant resources: coal, petroleum, water, air, and brains. Today, the United States is about 98 per cent. self-sufficient and entirely independent of foreign manufacturers with respect to normal peace-time demands for organic chemicals. And this applies not only to quantity, but also to quality.

"There is no shortage of satisfactory dyestuffs, of important medicinals, or of any other organic chemical necessary for the welfare of this country in normal times. The onset of war in 1914 found us pitifully dependent on belligerent nations for dyestuffs, coal-tar medicinals, potash, and nitrates. The years following the World War saw us strive successfully to remedy these lacks. Now we need not dread an insufficiency of these vital materials.

"At the present time there is no reason to become unduly alarmed at any effect that foreign wars may have on our peace-time chemical economy. But continued war abroad, or the entrance of the United States into the war, will undoubtedly result in a two-fold disruption: a shortage of a few, but very necessary, raw materials which are primarily imported, and an insufficient capacity for the manufacture, on a war-time scale, of certain materials which at present are being made only for civil purposes.

"Except for a very few materials for which we have neither substitutes nor sources in the Western Hemisphere, our supply of chemicals and of chemical raw materials is sufficient for normal requirements. We must be cautious about certain of the alloying metals, especially chromium; but we are rapidly laying in stocks of these. We should attempt to develop pain-relievers which are at least as effective as morphine. Above all, we should do something about our extreme dependence on our supply of rubber. And for purposes of national defense, we must enlarge our capacity for the production of chemicals which we now produce in amounts which are sufficient only for peace-time demands.

"Now, the construction and maintenance of plants whose output can be utilized only under wartime conditions is definitely the function of the government. It would not be efficient for any organization which is in business to make money to construct and maintain a plant for the manufacture of immense tonnages of a material like smokeless powder.

"Recognizing this fact, a portion of the National Defense Appropriation has been allocated to the Chemical Warfare Service. Thus it is that the United States government has appropriated twenty-five million dollars for the construction of a smokeless powder plant at Charleston, Ind., near Louisville, Ky. This plant will be owned by the government, but the Du Pont company, as specialists, has been retained to construct and operate it on a fixed fee basis. That the National Defense Commission is not procrastinating is evident from the fact that the construction of this immense plant is to be completed within ten months.

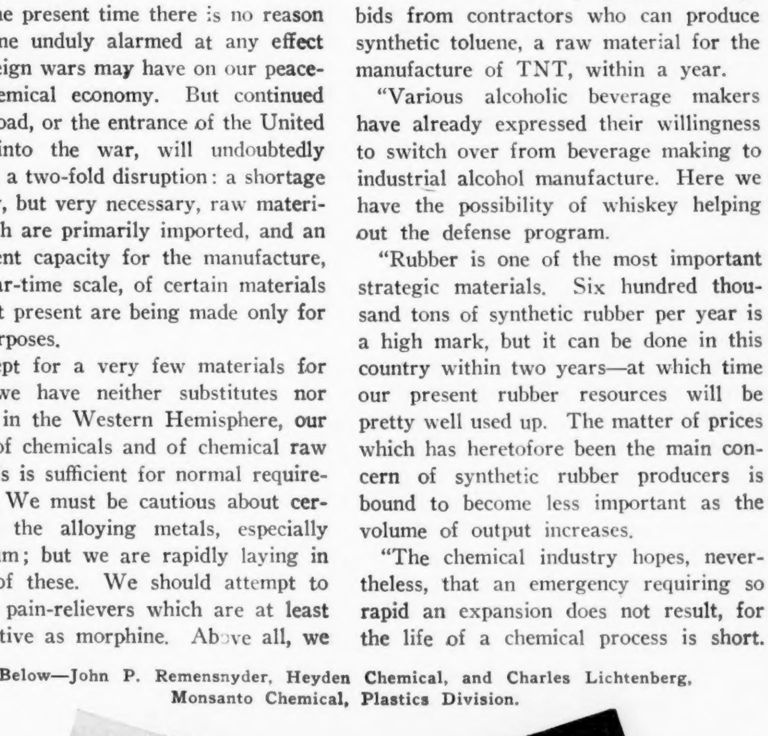
"The Defense Commission has also announced that it is prepared to accept bids from contractors who can produce synthetic toluene, a raw material for the manufacture of TNT, within a year.

"Various alcoholic beverage makers have already expressed their willingness to switch over from beverage making to industrial alcohol manufacture. Here we have the possibility of whiskey helping out the defense program.

"Rubber is one of the most important strategic materials. Six hundred thousand tons of synthetic rubber per year is a high mark, but it can be done in this country within two years—at which time our present rubber resources will be pretty well used up. The matter of prices which has heretofore been the main concern of synthetic rubber producers is bound to become less important as the volume of output increases.

"The chemical industry hopes, nevertheless, that an emergency requiring so rapid an expansion does not result, for the life of a chemical process is short.

Below—John P. Remensnyder, Heyden Chemical, and Charles Lichtenberg, Monsanto Chemical, Plastics Division.



John Freeman, U. S. Steel Corp., and S. S. Heide, Tennessee Coal, Iron and Railroad Co.

Five years from now these synthetic rubber plants, constructed at the expense of diverting skilled men and specialized machinery from more important national defense measures, may be obsolete. It seems more wise to be economical in our use of rubber now and to increase our output of reclaimed rubber even before necessity demands it. Although we use 600,000 tons of rubber per year, the government estimates that our minimum requirement for self-sufficiency is only 200,000 tons. Let us get down to the minimum requirement basis now and give our synthetic rubber infant a chance to grow into manhood normally."

Census of Scientists

Plans to gear a powerful segment of the nation's scientists to the defense program were announced at the Detroit meeting.

Frolich Discusses "Butyl"

The widespread interest in the development of synthetic rubbers as a protection against a possible complete curtailment of imports of the natural material naturally attracted a large audience to the general meeting held on Monday, September 9 at which Dr. Per K. Frolich, director of the chemical division of the Esso Laboratories, spoke on "butyl rubber."

"The Esso Laboratories are still busy evaluating butyl rubber for as many of its potential uses as possible by such tests as can be devised," said Dr. Frolich, who delivered the paper in collaboration with R. M. Thomas, I. E. Lightbown, W. J. Sparks, and E. V. Murphree.

"Because of the dominating importance of the automobile tire field as an outlet for rubber, tests were undertaken on a small scale early in the development to answer the question as to whether or not butyl rubber had any possibilities in this direction. Most of the efforts, however, were concentrated on problems involved in the manufacturing process.

"When the future supply of natural rubber became a matter of national concern, Standard was requested by the Army and Navy Munitions Board to cooperate with one or more rubber companies to the end that the suitability of butyl rubber for tire manufacture could be determined at the earliest possible moment. Such a program was promptly undertaken and is still in progress."

Dr. and Mrs. Harry L. Fisher, U. S. Industrial Chemicals, Inc.

Butyl rubber, a 100 per cent. petroleum hydrocarbon product, is a "radical departure from the conventional approach to the problem of supplying the nation's need for synthetic rubber," Dr. Frolich declared. Distinctive characteristics of the new synthetic include greater ability to stretch than natural rubber; remarkable stability and durability; freedom from impurity, taste and odor; lack of color; good age, tear and abrasion resistance; amazing resistance to mineral acids, and unusual electrical properties.

Because petroleum and rubber are built up of the same two chemical elements, carbon and hydrogen, the Standard Oil Development Company became interested in synthetic rubber possibilities. "It would seem," Dr. Frolich pointed out, "that the petroleum industry with its abundant supply of low cost hydrocarbons is in the best position to supply our needs of synthetic rubber."

The fundamental chemical difference between natural and butyl rubber is that the natural rubber molecule is highly "unsaturated", while the butyl rubber molecule is unsaturated only just enough to allow it to be vulcanized, and no more. This control of unsaturation is the key to butyl rubber's distinctive properties.

The degree of unsaturation of a chemical compound measures its ability to unite with certain other elements or compounds without elimination of any side product. The vulcanization of natural rubber is made possible by the chemical unsaturation of the rubber molecule which permits reaction with sulfur to take place in such a manner that the long molecular chains are tied or linked together into a firm structure.

Nature's rubber is made up of extremely long, chain-like molecules in which the atoms are so arranged that a product is obtained with a high degree of elasticity. Rubber, however, does not have much mechanical strength until it has been vulcanized.

"The reason why rubber has become one of our most valuable and widely used structural materials can be attributed to two of its molecular characteristics—elasticity and unsaturation," Dr. Frolich explained. "However, this very chemical unsaturation which is so essential from the standpoint of vulcanization is also the greatest shortcoming of rubber for the reason that there is too much of it.

"Rubber is so highly unsaturated that it remains unstable and chemically reactive even after it has been combined with the small amount of sulfur normally required in the vulcanization process. If we try to use enough sulfur to overcome this difficulty, we obtain hard rubber or ebonite—which obviously is not the answer for the production of elastic and pliable rubber goods.

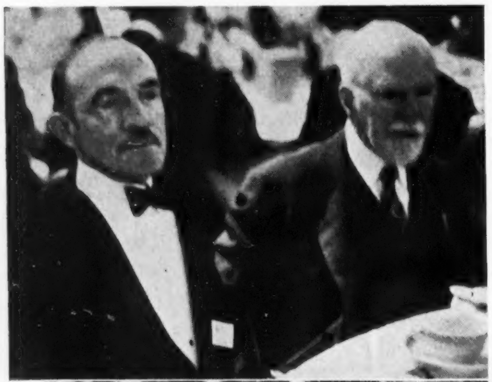
"In spite of the remarkable progress which has been made in rubber technology in the last decades, it has not been possible to prevent rubber articles from continuing to combine with chemically reactive agents. The most serious manifestation of this is the well-known deterioration of rubber on aging, due to chemical attack by oxygen from the air. Just as a spare tire loses more and more of its potential road mileage as it grows older, so all of our many rubber household articles, including rubber-insulated electric wiring, gradually deteriorate until they have to be replaced.

"Nature's rubber molecule and all its synthetic semblances are either wholly or predominantly polymers, or multiples, of much smaller molecules which belong to a class of highly unsaturated compounds called diolefins. It is to this diolefinic origin that the natural and synthetic rubbers owe their extreme degree of unsaturation and resultant chemical reactivity.

"Chemists working on rubber have been inclined to associate the elasticity and other important physical properties of rubber with its chemical unsaturation. Chemists in the Esso Laboratories, however, in their studies of chain-like polymers with no residual unsaturation, recognized a majority of these important rubber-like properties. Polymers with no residual unsaturation may be made by uniting the simple olefins, or compounds, which are readily available as constituents of petroleum refinery gases. But these olefins because of their saturated character resist all efforts to vulcanize them with sulfur.

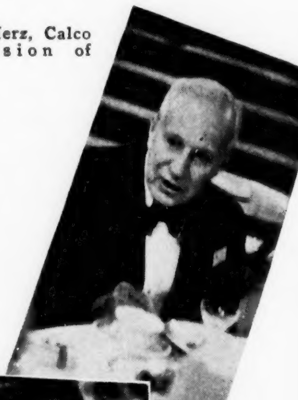
"Through long years of research by a large group of men, the Esso Laboratories have now developed a method of co-polymerizing olefins with small amounts of diolefins to give just the proper degree of unsaturation for vulcanization—but no more.

"Out of these efforts has come butyl



Left, Gustav Egloff, Universal Oil Products, and Dr. Florus R. Baxter, Socony-Vacuum.

Right, August Merz, Calco Chemical Division of Cyanamid.



Directly below, F. J. Curtis, T. S. Carswell, and C. A. Hochwalt, all of Monsanto. To the left, C. R. Downs, Weiss & Downs, Inc., and Norman A. Shepard, Cyanamid.

rubber which after vulcanization is a product with substantially no residual chemical unsaturation. As a result, butyl rubber is characterized by a remarkable stability and durability which for many purposes make it superior to natural rubber and to other synthetics.

"By variations in the composition of the raw materials employed, it is possible to obtain products that differ considerably in their detailed properties, but the basic characteristic remains the same insofar as the limited unsaturation is concerned."

Dr. Frolich pointed out that there is a definite economic advantage in being able to utilize largely the simple olefins from refinery gases rather than the more expensive highly purified diolefinic materials employed so far in the manufacture of synthetic rubbers.

"Aside from its practical value, the discovery of the butyl rubber process will have far reaching theoretical consequences," he continued. "It will automatically eliminate a great many speculative theories concerning the factors contributing to rubber-like properties and in so doing it will help to clarify and simplify our concepts. This in turn may be expected to act as a stimulus to further progress in the field of rubber technology."

Representing a radical departure from natural rubber and other synthetic rubbers, butyl rubber differs from these products in many apparent respects, according to Dr. Frolich. Because of its freedom from impurities insofar as these can be detected by ordinary chemical analysis, butyl rubber is colorless, odorless, and tasteless.

"Since, like natural rubber, it is a hydrocarbon, butyl rubber definitely does not belong in the class of synthetics that are resistant to swelling in petroleum solvents." Dr. Frolich added. "Somewhat paradoxically, however, it is more resistant to such simple aromatics as benzol and toluol than even the synthetic rubbers now employed in the construction of gasoline dispensing hose. It is more resistant than natural rubber to many oxygenated compounds and to certain other solvents such as ethylene dichloride.

"By some modification of the technique employed, butyl rubber may be processed and vulcanized in much the same manner as natural rubber. It may be compounded, either heavily or lightly, to obtain any type of stock, but in general it vulcanizes somewhat more slowly than natural rubber. It may be more highly loaded with carbon black and other pigments to give products of a given hardness, and this is an economic advantage.

"The tensile strength of butyl rubber is comparable to that of natural rubber in compounds which do not contain carbon black. As butyl rubber stretches much more than natural rubber for a given load, its strength per unit cross-sectional area at the point of break is actually much greater. Its tensile strength is not increased to the same extent as for natural rubber on the addition of large volumes of carbon black, but other properties such as tear resistance and abrasion resistance are affected in much the same way as in the case of natural rubber.

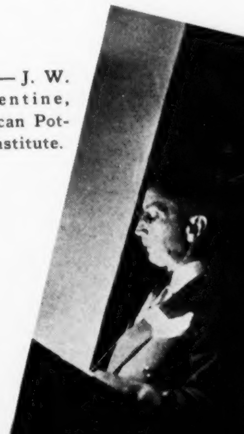
"Butyl rubber is readily molded even into articles of intricate design, and its good tear resistance is an aid in removing

Walter Breuer, in charge of Reichhold Chemicals' activities in France and Carl Fritsche of the same company.

such products from the hot mold. Its abrasion resistance may be made comparable to that of natural rubber, and it is also more resistant to continued flexing both hot and cold. Indeed, it will flex without cracking at a lower temperature than any other rubber, natural or synthetic.

"Although butyl rubber is more age-resistant than natural rubber, it is advisable to add carbon black to prevent butyl rubber from becoming tacky on continued exposure to direct sunlight. Such carbon black compounded stocks are considerably more sunlight resistant than natural rubber.

"Further manifestations of butyl rubber's saturated character are its remarkable resistance to strong mineral acids and its unusual electrical properties. Hot concentrated nitric acid, for example, has no visible effect on the new product during a time interval which is sufficient to make a similar sample of natural rubber disappear completely. As an insulating material it is superior to all other types of rubber, and its electrical properties are not adversely affected on immersion in water.



Right — J. W. Turrentine, American Potash Institute.

Left—John S. Andrews, General Mills, and Edward L. Gordy, W. C. Hardesty Company.

Below—Walter W. Durant and William H. Harding, both of Cyanamid's Stamford laboratories; at the left—Marle J. Griffin, Westvaco, and Harold F. Wakefield, Bakelite.

"Butyl rubber is less permeable to both chemically active and inactive gases than natural rubber. Thus, it is many times as resistant to penetration of such gases as hydrogen and helium. It bounces much less than natural rubber at room temperature, but as the temperature is increased to 200 degrees Fahrenheit the rebound approaches that of natural rubber."

Properties of Vistanex

The properties of "Vistanex Polybutene", rubber-like material, also made from petroleum, manufactured by Standard Oil Development and marketed by Advance Solvents and Chemical, were discussed by S. Longman of the latter company before the Division of Rubber Chemistry.

What About Quinine?

Science has brought us nearer complete independence of foreign sources of quinine, needed to combat malaria, it was reported. Chemists of Purdue told of the discovery of an easy method of making one vital part of synthetic antimalarials from raw materials widely available in this country and nowhere else.

There are at present only three drugs of real value in the treatment of malaria, it was explained. These are quinine, which is obtained entirely from Java in the Dutch East Indies, and the synthetic antimalarials atabrine and plasmochin, which are manufactured in this country by Winthrop Chemical. Atabrine and plasmochin supplement quinine; they can be used in conjunction with quinine, thus conserving supplies of that important drug.

The U. S. Public Health Service, however, is seeking better quinine substitutes, and is relying on the synthetic organic chemists to develop them. Substantial progress was announced by Prof. Henry B. Hass and H. C. Huffman of Purdue.

Announces Porcelain-like Finish

A new synthetic resin using waste wood, corn or molasses, and limestone, coal and air as basic raw materials, and which gives a hard porcelain-like finish when applied to metals, occupied the spotlight at the Tuesday morning session of the Resin Group.

Melamine-Formaldehyde is the name of this chemurgic curiosity. It is a new product, introduced by Reichhold Chemicals, Inc., whom T. S. Hodgins, A. G. Hovey, S. Hewett, W. R. Barrett and C. J. Meeske represented in explaining the chemical structure and uses of Melamine.

The molecule of Melamine is a complex compound of nitrogen, hydrogen and carbon, hexagonal in shape, with three handles extending from alternate corners of the hexagon. When employed in baking enamels, these handles join in friendly and permanent handclasp with similar handles extending from each adjoining molecule thus forming a permanent and continuous physical structure which accounts for the hard, marproof porcelain-like surface obtainable.

In actual adaptation, Melamine resin is blended in appropriate ratio with urea or alkyd resins or both, the alkyd resin furnishing the adhesion and flexibility in which either the Melamine or urea resins alone are lacking. In combination these three resins result in a beautiful polychromatic effect thus bringing out full lustre and giving a depth of color and an apparent physical depth of film to the enamel coating heretofore unobtainable.

The baking time schedule for this new versatile synthetic resin type of enamel is measured in minutes as compared to a measurement in hours for porcelain enamels.

Likewise, the baking temperatures for Melamine-urea-alkyd enamels range between 180° and 320°F., whereas porcelain enamels have baking temperatures ranging between 1600° and 2000°F. and, in some instances, reach the magnitude of 3000°F. Where resistance to chipping and sudden impact is important, these more elastic synthetic enamels should prove superior to many porcelain enamels heretofore in common use, according to the authors of the paper.

Melamine itself was discussed in detail by Dr. P. P. McClellan of Cyanamid's Stamford laboratories staff. As a plastic molding compound, melamine, because of its peculiar physical properties has been in great demand, particularly by the aircraft industry, but its price was prohibitive. A laboratory curiosity only two years ago, quoted at $40 a pound, it is now being produced on a tonnage basis at 55 cents a pound, according to Dr. McClellan.

Improving Lubricants

The wear-prevention qualities of lubricating oil can be multiplied as much as 17 times by the addition of two groups of chemical agents, scientists of the Emeryville, Calif., laboratories of the Shell Development Company reported at a symposium on "The Contribution of Petroleum Chemistry to the Automotive Industry".

Dew Effect on Finishes

Dew plays an important part in causing failure of automobile finishes. Finishes which are subjected to dew followed by sunshine fail much more rapidly than finishes which receive the same amount of sunshine but no dew, is the conclusion presented by Ralph J. Wirshing assistant head of the general chemistry department of General Motors Research Laboratories.

Properties of Nylon

Dr. G. P. Hoff, director of nylon research for Du Pont, afforded his fellow chemists a behind-the-scenes glimpse of nylon's molecular structure.

Dr. Hoff traced the long studies of chemical and physical phenomena leading to the discovery and development of nylon, and pictured the complex engineering facilities necessary to its production. It was the first public presentation of a scientific paper on this wholly new family of materials.

Dr. Hoff's address considered nylon only as a textile fiber, although he pointed out that an indefinite number of nylons, differing widely in their physical properties can be made.

Describing the exploration of a little-known chemical kingdom in which molecules ten-millionths of an inch long were classed as "giants," Dr. Hoff demonstrated nylon's kinship with natural proteins such as wool and silk. Both, he explained, have a common linear structure to which nylon is closely related.

Strength, elasticity and low water absorption of nylon yarn were cited from the results of laboratory tests. Its elastic recovery was shown to be 100 per cent., as against 50 per cent. for silk, 50 per cent. for acetate rayon, and 30 per cent. for viscose rayon.

Its dry strength is appreciably higher than that of silk or any type of rayon, while its wet strength, only slightly less, was as high as dry silk, Dr. Hoff said. In one test, water absorption of nylon was measured at 3.5 per cent., contrasted with 13 per cent. for wool, 12 per cent. for viscose rayon and 11 per cent. for silk.

Practically Non-flammable

Nylon yarn and fabrics were termed "practically non-flammable" in the parlance of the Underwriters' Laboratories. As currently offered, they have the high melting point of 487 degrees F. The material is resistant to mildew, molds and moths.

Nylon has been exhaustively tested for physiological activity, and proved to be completely inert. It has found use in the form of surgical sutures, he said.

Another notable quality, Dr. Hoff related, is that hot water or steam imparts a substantially permanent "set" to nylon yarn and fabrics. If a piece of yarn is straight when treated, it tends thereafter to retain that form, or, if a fabric is smooth before treatment, its tendency is to remain so Advantage is taken of this property in making nylon stockings, in that repeated wear and washing will not alter their original shape.

Above—Natives gathering cut Carnauba palm leaves. Right—Section of Carnauba wax storage room of S. C. Johnson & Son, Inc.

CARNAUBA WAX

From Plantation To Industry

By Dan F. Sweet

Last Month Our Author Described the Growing, Harvesting, Drying, etc., of Carnauba Leaves from Which the Wax Is Obtained. In This Section of His Comprehensive Article, He Discusses Marketing and Processing of this Important Specialty Ingredient.

ALTHOUGH most of the melting of the powdered wax is done on the property where it is extracted it is not unusual to ship it in bags to the coast. Of course care must be taken in keeping separate the "olho," or wax from young yellow leaves, and the "palha," or wax from older green leaves. The powder from the "olho" is a whitish gray while that of the "palha" is of a deeper grayish yellow hue.

The wax is melted directly over a wood or charcoal fire in open iron pots and is stirred constantly during the operations. A full 5-gallon can of powder will melt down to less than a quart of molten wax. Water is added to the "palha" to make the "arenosa" (chalky) wax while the wax powder is melted dry to make the "gordurosa" (waxy). In the case of "olho," which yields prime yellow qualities, no water is added.

The molten wax, which contains a large amount of leafy fiber, is poured through cheese cloth and is filtered. The cloth is twisted and wrung by hand or placed under a crude type of filter press. In the case of the "olho" the wax is drained off into little pans and in the case of the "palha" into large cans such as kerosene or gasoline containers. The wax may be remelted if impurities are found. The pure wax forms on the top while the impurities settle out at the bottom. The wax is withdrawn and broken into smaller pieces with a hammer while the wax in the residue is recovered through more cooking and straining. In the State of Ceará is the first and only mill for the extraction of the wax. This equipment and capital belongs to the Johnson Co. who are now extracting the wax themselves for their own use.

Brazilian inventors have been bringing out new inventions for carnauba wax extraction during the past few years. These extractors have been for the purpose of extracting the wax from the leaf after it has been allowed to dry. One particular machine that is being manufactured in Rio de Janeiro found that the blades beating the palm leaves did not function very satisfactorily and frequently broke. However, this is more of a minor fault and could be corrected through improved manufacturing methods. Although some of the machines have worked quite satisfactorily some claim that the benefits are exaggerated.* These machines, of course, increase the amount of leaves handled but still do not solve the principal problem, which is the loss of 30 to 40 per cent. of the wax in dust form before it reaches the melting pots. In the future better machines will probably be manufactured which will aid in obtaining the dry wax from the leaves after drying.

* Report of the Assistant Trade Commissioner, Rio de Janeiro, November 30, 1938.

Some of the wax as it comes to this country still has to be put through additional purification steps because the crude methods of extraction are only sufficient to extract straw and other impurities. Clay purification is one of the general steps used for refining the wax, and is sometimes followed by the use of aluminum screening for increased purification. However, in the making of floor wax chunks of carnauba wax and other waxes are mixed in huge kettles. With the application of careful heating the various ingredients are melted into a thin mixture and the impurities are able to be removed by settling, thus leaving a wax of the required purity.

In the decolorizing of the wax for purposes where a light color is desired the use of a strong oxidizing agent such as chromic acid is used.

Marketing Steps and Functions

There are two primary classes of carnauba wax which are determined by the type of leaf from which the powder is extracted. The "cera de palha" or "straw wax" is extracted from the outside fan edge of the large mature leaves. From the smaller yellow leaf is extracted the "cera de olho" or "eye" wax. The class of wax is therefore known before the leaf is cut.

Seven Types of Wax

In Brazil there are at present seven types of wax. These seven are all some type of the "palha" or the "olho" which have been discussed as the primary class.

The following data are from the National Institute of Technology at Brazil and were taken on samples of the wax from the State of Ceará.

(1) The "Flower" type of wax exists in a small quantity and is of the best quality with hardly any impurities at all. In color it is almost the same as the yolk of an egg. Because of the small quantities it hardly appears on export lists.

Analysis of the "Flower" wax

Wax	99.32%
Moisture	.48%
Impurities	.20%

Iodine index 22.6
Melting point 84 Degrees C. (183.2° F.)

(2) The "First" wax varies in color from dark to light with an insignificant percentage of impurities.

Analysis of the "First" wax

Wax	99.65%
Moisture	.35%
Impurities	.00%

Iodine index 24.3
Melting point 83 Degrees C. (181.4° F.)

(3) The "Medium" type of wax is generally of a uniform color and varies from light yellow to light gray, according to the age of the tree and the process to which it has been submitted.

Analysis of the "Medium" wax

Wax	99.53%
Moisture	.42%
Impurities	.00%

Iodine index 21.6
Melting point 83 Degrees C. (181.4° F.)

(4) The "Sandy" type of wax varies in color from light to dark gray and is rough to the touch.

Analysis of the "Sandy" wax

Wax	97.16%
Moisture	1.09%
Impurities	1.75%

Iodine index 16.7
Melting point 86 Degrees C. (187° F.)

(5) The "Fat" type of wax is the darkest, being almost black. It contains a large percentage of impurities and is the most inferior type of carnauba wax.

Workmen pour crude carnauba wax into chutes which lead to melting kettles.

Analysis of the "Fat" wax

Wax	96.91%
Moisture	.59%
Impurities	2.50%

Iodine index 16.00
Melting point 85 Degrees C. (184° F.)

Two other types of wax are the (6) Medium purple and the (7) "Cauipẽ," which are of little importance for use in manufacturing.

The names of the grades which are used in export from Brazil are:

Grades	Consumption (estimates)
North Country (anhydrous)	30%
North Country (refined)	15%
No. 3 Chalky (7-10% water)	15%
No. 1 Yellow	20%
No. 2 Yellow	10%
No. 2 North Country	10%

The No. 1 yellow as well as the No. 2 yellow comes from the wax dust obtained from the "olho" wax. These two grades are made from the new leaves of the palm tree which the tree puts out every year and are exceptionally free from dirt and other foreign substances. Practically the only difference in the two yellow grades is that of color. The No. 1 wax has a color somewhat darker than the egg yolk color of the "flower" wax that has been discussed. This wax is the most desirable for fine quality waxes. The No. 2 yellow has a slight slate tinge and its usefulness is almost equal to that of the No. 1 wax.

The "palha" produces the arenosa or chalky wax and also the waxy North Country grade. These two grades can be obtained at the will of the worker because with the chalky wax water is added as the batch is melting and the North Country grade is that wax which has been allowed to melt without the addition of water. The chalky grade contains from 7 to 10 per cent. water, of which perhaps one per cent. is lost after sacking. This wax varies from a dull gray to a dark green color and although rough to the touch should not contain any sand if properly handled.

The three grades of North Country wax when melted dry form a toasted wax which is graded into the No. 3 North Country (anhydrous) and the No. 2 North Country. This No. 2 North Country is the same as the North Country and only designates the source of supply in Brazil. Further filtering of this wax produces the No. 3 North Country (refined) which is being used more extensively because of the lack of dirt and foreign matter. An estimate of 30 per cent. use for the No. 3 North Country can be given. This grade along with the No. 3 Chalky are the two main waxes used today.

The State of Ceará produces all of these waxes. The "palha" grade furnishes approximately 70 per cent. of the output of the wax while the remainder is made up of the yellow grades including a small percentage of the "flower" wax.

The State of Piauhy furnishes most of the palha or North Country with Rio Grande do Norte furnishing most of the chalky.

Supply and Demand

The grading has something to do with the factors of supply and demand. If there is a shortage of wax the No. 2 Yellow becomes the No. 1 Yellow and a higher price is charged. There is no guarantee on the color or purity and even the same grade will vary in a shipment, since practically all of the grading is done in Brazil. This is a state of constant annoyance for large users of carnauba wax and if a suitable substitute could be found, the market for this wax should diminish rapidly.

The following figures give the main uses of Carnauba Wax and different grades used. These figures are a rough estimate.

Carnauba dealers have been offering for sale different grades and blends of waxes under diverse names such as Carnauba Substitutes, Carnauba Residue No. 1-10 which in no way resemble carnauba wax in any physical or chemical behavior.

Scene in Wax Tower, S. C. Johnson & Son, Inc., showing wax in melting kettles.

Packing

Carnauba wax is packed by exporters in heavy jute bags weighing from 175 to 200 pounds each. The wax itself is in the form of lumps weighing from one to five pounds. The wax when imported is purchased in lots ranging from five to twenty-five tons. The grade of wax is plainly written on tags attached to the bags along with their weight.

Distribution

The transportation of the wax from the producer to the consumer takes place in approximately three steps. The first is that of transporting the wax from the producing centers to the coast for shipment to the various countries doing the importing. Mule teams and wagons are used in this step. The second step is the shipment of the wax by steamship. One of the United States largest importers uses the Booth American Steamship line which flies the British flag. Most of the American shipping lines have stopped shipment of the wax because of the war and as long as this continues there will be a shortage of the wax. Already one British freighter has been sunk on its way bound for a carnauba wax shipment port. Ocean freight rates which had jumped at the start of the war have already advanced to new levels. War risk insurance is now up to 5-6 per cent. Some shipping companies now are leaving much doubt in the minds of importers as to the future shipments to this country. The third step in transportation is that of moving the shipments from the docks to warehouses or to the consumers of the wax. To those places near enough to the docks trucks are used but on long hauls railroad transportation is resorted to.

Importers

Carnauba wax is one of the raw materials which are purchased largely by brokers and importing houses in the United States. At least one company deals direct with the producers of the wax. With the rising tide of our chemical exports, a growing brokerage business is being done with accounts of foreign exports. Most of this trade is quite naturally gravitating to the old well-established chemical houses, merchants and sales agents who have a somewhat detailed knowledge of the sources of chemical supply. This is partially the case in carnauba wax.

Today there are about eight principal concerns in New York importing the wax from Brazil. All of these importers are members of the Wax Importers Association. There is no regulation of prices by the Association. Any variations of prices originate from the shippers in Brazil and are supposedly due to crop conditions and size of the crop but often from plain manipulation of the market.

There are numerous exporters in Brazil who buy up the wax from the various proprietors on which the palms grow. These exporters in turn contact the importing companies in the United States and arrange terms.

There are at least one or two companies which deal directly through their own import force with the Brazilian exporters in securing the wax.

Storing

After the wax has been melted and packed in jute bags it is shipped to the coast to await shipment to the various consuming countries, preferably with the United States, Great Britain, Germany, Netherlands, France and Italy. While awaiting shipment the wax is stored in warehouses of the export companies.

Arrival in This Country

When the wax arrives in this country practically all of it is immediately shipped to its users. These consumers have ordered the wax in advance through importers or in some cases through their own departments. The large import

	Consumption in pounds	Per cent.	Grade used in pounds	
No Rub Wax Emulsion Floor Polish	5,760,000	35	2,680,000	No. 3
			1,580,000	No. 2
			1,500,000	No. 1
Leather Dressing and Shoe Polish	4,480,000	28	3,000,000	No. 3
			480,000	No. 2
			1,000,000	No. 1
Paste and Liquid Polish for Floor and Auto	2,240,000	14	1,680,000	No. 3
			560,000	No. 2
Carbon Paper Coating	1,920,000	12	1,000,000	No. 3
			920,000	No. 2
Paper Sizing and Polish	480,000	3	480,000	No. 1
Paper impregnating, bottle caps, etc.	320,000	2	320,000	No. 3
Miscellaneous	800,000	5	500,000	No. 1
			300,000	No. 2
1939 (approximate)	16,000,000			

TOTAL EXPORTS FROM BRAZIL SINCE 1920*

Year	Amount in tons (metric)	Amount in pounds	Dollar value
1920	3,515	7,747,060	
1921	3,905	8,606,620	
1922	5,004	11,028,816	
1923	4,341	9,567,564	
1924	4,992	11,002,368	
1925	5,114	11,271,256	
1926	5,768	12,712,672	
1927	7,033	15,500,732	
1928	6,981	15,386,124	
1929	6,432	14,176,128	
1930	6,714	14,797,656	
1931†			
1932†			
1933	6,766	14,812,264	$1,698,141
1934	6,049	13,331,996	2,306,860
1935	6,503	14,332,612	4,089,104
1936	8,635	19,031,540	8,389,369
1937	8,801	19,397,404	6,026,883
1938	9,105	20,190,000	5,858,000
1939‡	...6,651	14,676,000	4,085,000

* Department of Commerce, Bureau of Foreign and Domestic Commerce.
† Not obtainable.
‡ 8 months.

IMPORTS OF CARNAUBA WAX INTO THE UNITED STATES[1]

Year	Amount in tons (metric)	Amount in pounds	Dollar value
1920	2,206	4,864,230	
1921	2,183	4,813,515	
1922	2,479	6,456,195	
1923	2,134	4,705,470	
1924	1,986	4,379,130	
1925	1,981	4,368,105	
1926	2,197	4,842,188	
1927	2,767	6,098,468	
1928	2,912	6,418,048	
1929	3,180	7,008,720	
1930	3,182	7,013,128	
1931	3,379	7,447,316	$1,070,281
1932	2,797	6,164,588	733,292
1933	2,503	5,516,612	969,675
1934	3,558	7,841,832	1,528,302
1935	4,721	10,420,568	2,789,493
1936	5,669	12,500,241	4,286,492
1937	6,310	13,915,687	4,800,606
1938	5,611	12,377,230	3,926,635
1939	7,418	16,358,508	4,928,147

[1] Department of Commerce, Bureau of Foreign and Domestic Commerce.

companies have their own storehouses for the wax. As the case is, carnauba is just one of the many waxes that are dealt with by these importers. These waxes are all stored in the same manner. That is, in bags which are piled on top of each other in the storerooms. The large wax consumers have their own store rooms because they are constantly using the wax and must always have a good reserve on hand.

There is one problem involved in storing the chalky wax. Because of its high water content (7-10 per cent.) it cannot be held in storage too long because of evaporation of the water from the wax. This means loss of weight in each bag and will result in the loss of money to the company holding the wax in storage. After the bags have been in storage and are ready for shipment they are carefully weighed again to see how much weight they have lost.

Export Trade from Brazil

The poor grading of the wax has been the cause of considerable dissatisfaction and several dealers who formerly exported from Rio de Janeiro have given up the practice of shipping from that port, stating that because of the lack of proper grading of the wax in the State of Ceará and some of the producing states makes it impossible to export satisfactorily from Rio de Janeiro. The bulk of carnauba wax exports has always gone from Ilha do Cajueiro and Fortaliza, two ports of Northern Brazil, to the centers of production. Exporting companies are situated in the states of Pará, Maranhao, Piaui, Clará, Rio Grande do Norte, Pernambuco, Baiã, and Rio de Janeiro.

Today the wax producing states have no manufacturing industries utilizing carnauba wax, unless exception is made of the minor home industry of candle-making. The shipment of the wax from the mentioned states therefore corresponds very closely to the total production.

The states and the municipalities in Brazil have various taxes levied on the production and export of carnauba wax. The state export taxes vary from 3 per cent. ad valorem in Parahyba to 10 per cent. ad valorem in Ceará and Piauhy. The municipal taxes range from 3/10 of a cent per kilo to 2 per cent. ad valorem. In Piauhy a tax of from $0.25 to $0.50 is levied on the scythes used in the production of carnauba wax.

The first exports of carnauba wax from Brazil were made in the year 1846 from Fortaleza, the port of the State of Ceará to the amount of 26 tons of 57,330 pounds. Fourteen years later, in 1860, 681 tons of 1,499,400 pounds were exported from that port.

During the past twenty-five or thirty years, the United States has always been the principal market for carnauba wax. As mentioned before, Great Britain is generally in second place, but sometimes replaced by Germany. The Netherlands, France and Italy are the other leading markets for the wax. The United States is now taking about 75 per cent. of all the wax produced in Brazil.

Import Trade into the United States

The following table is a breakdown of marketing costs which incur in the passage of 100 pounds of wax from the producer to the consumer.

The price is 60c a pound which is the quotation on the Carnauba No. 1 Yellow at the present time (August 15).

100 pounds at 60c per pound = $60*	
(1) Growing Costs	$51.33
(2) Exporter (4.5% profit)	2.70
(3) Transportation ($.01½ per pound × 100)	.90
(4) Weighing (handling) per 100 pounds	.04
(5) Finance, insurance ⅜ of 1% of $60	.23
(6) Miscellaneous 2% of 100 pounds ...	1.20
(7) Profit to the importer (6% of 100 pounds)	3.60
Total	$60.00

* Confidential source.

The $51.33 (on a relative basis) is used in growing the palm and securing the wax for shipment by the exporter. Rental of land, hiring of help, gathering and melting the wax and taxes are included in this figure. The reason that the price of the No. 1 Yellows is up this year is probably due to the short crop in Brazil this past year and also the present war conditions. According to import figures the volume in pounds of wax exceeded the previous year, but at present the demand has increased to a very large extent. There is also the possibility of manipulation which can be covered up to a large extent by the excuse of "present world conditions."

Terms of Payment

Today because of the present war risk the question of safe delivery is questioned and carnauba wax is purchased on a sixty, ninety or sometimes thirty-day irrevocable Letter of Credit. However, according to one dealer, shipments to the United States have been paid for on the following basis: from 30 per cent. to 70 per cent. of the purchase price is paid on a cash basis against documents, while the remainder is paid upon receipt and inspection on the wax. This procedure was occasioned by the poor grading of the wax and is not being used at the present time.

Today Brazil wants 100 per cent. payment. She does not favor Britain's or France's method because of the fluctuations in the pound sterling and the franc respectively. Because of this, financing with these countries has been extremely difficult.

One advantage that the consumer of the wax has is that it is permitted to come into this country duty free. The only duties levied on the wax are those placed on it by the producing States which levy export taxes and cannot exactly be called a duty tax.

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The Pulse of Opinion—

Acetone

C. L. GABRIEL
Manager Sales Promotion
Commercial Solvents Corp.

THE acetone situation is entirely different today than was the case at the outbreak of the first World War. In 1914 acetone production amounted to but a few million pounds per year, was entirely made from acetate of lime, and was chiefly used in the manufacture of photographic film and in acetylene cylinders as an absorbent for this gas. The war created an annual demand far greater than the normal peace-time production of acetone. Acetone was an essential material for making Cordite, a high explosive used by the British. By great effort production for the year 1914 was raised to about 10,000,000 pounds. Toward the end of the war some acetone was made by the expensive procedure of converting vinegar made from alcohol into dry acetate of lime and destructively distilling this. A more important process which was commercially developed about the same time involved the fermentation of corn to butanol and acetone. Acetone made by this process entirely eliminated its production from acetate of lime in the early Twenties.

The fermentation process utilizing blackstrap molasses instead of corn is still being used on a large scale, but the amount of acetone produced by it is not sufficient to meet the peace-time domestic requirements today. The production of acetone from propylene, a gas obtained from oil cracking processes, now constitutes the largest domestic source for this material. While in 1919, the first post war year, domestic production of acetone totalled about 6,000,000 pounds, in the late Twenties output was rapidly augmented. Figures of the U. S. Tariff Commission show that acetone production increased steadily from about 42,000,000 pounds in 1933 to 100,000,000 pounds in 1939. The increase in demand has been largely brought about by the growth of the cellulose acetate fiber and plastics industries.

While the present war will naturally bring a greater demand for acetone, the amount involved, contrary to the 1914 situation, represents but a relatively small proportion of our domestic production. This is also true of the increased export demand, which should hold at a reasonable level due to the synthetic production of acetone in Japan, Canada and Great Britain.

It is therefore apparent that any new domestic plant capacity for producing acetone will be encouraged by the growth of industries using cellulose acetate rather than by increased war-time demand.

Industrial Alcohol

GLENN HASKELL
First Vice-President
U. S. Industrial Chemicals, Inc.

ALCOHOL is listed by the Army and Navy Munitions Board as an essential material and derives its importance for national defense from its wide utility as a chemical raw material. It is a solvent, or component, in the manufacture of explosives, toxic gases, anti-freeze, control instruments, automotive fuels, antiseptics, anesthetics, drugs, dyes, lotions, cutting oils, photographic supplies and many organic chemicals.

The principal production of alcohol is by fermentation of molasses, grain, or other sugar or starch bearing materials. These are obtained in abundant quantities from the United States, West Indies and Hawaii. There are also large quantities of alcohol produced from the ethylene available in "Cracked" gases incident to the manufacture of gasoline from petroleum.

In general, the trend of production of industrial alcohol in the past ten years has shown no change, brought about by the fact that substitutes, particularly for anti-freeze purposes, have replaced considerable volume. Hence there is at the present time sufficient capacity available to take care of the increased demand occasioned by the rearmament program of our government and there is no immediate likelihood of any substantial increase in productive capacity. An increase could, however, be effected without undue difficulty in case of necessity, or in the event of the development of new uses.

Crude Drugs

S. B. PENICK
President
S. B. Penick & Company

WITH regard to availability of supplies of crude drugs, there is a substantial number of European, Near East, and North African products which will be difficult in some cases, and impossible in others, to replenish until the end of the war. Domestic sources are available for only a very few. Some are being cultivated, however, and others are being gathered from wild growth but labor costs make the production almost prohibitive. In some instances there are suitable substitutes.

There is a likelihood of creating a domestic supply sufficient for our needs should the war extend two or three years, and we are actually engaged in this endeavor at present.

The export demand upon supplies of this country has been only moderate and should it not increase in volume appreciably, we will be in position to serve at least the Western Hemisphere reasonably well under existing conditions.

Personalities in Chemistry

By A. D. McFadyen

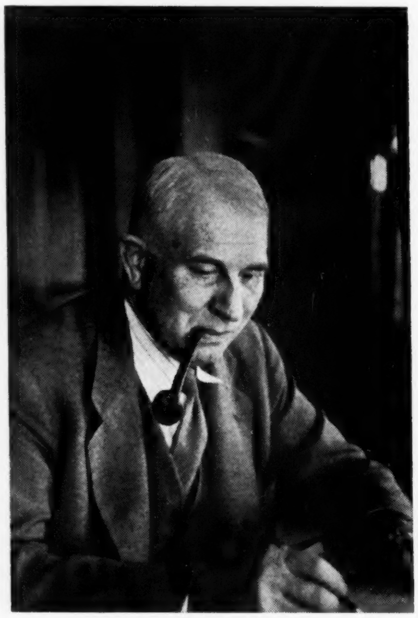
THOUGH Walter Savage Landis, Vice-President of American Cyanamid Company, was the 1939 recipient of the coveted Perkin Medal in recognition of his "work on cyanamide and its derivatives and on fertilizers (particularly Ammonium phosphate), for the first commercial production of argon, and for contributions to the explosive industry," his modesty prompts him to protest being called an inventor or even a trail blazing scientist. According to Dr. Landis, he has "merely found ways to use what had been discovered by others." But in the eyes of the world its greatest benefactors often are those who have availed themselves of existing knowledge and materials to supply human wants.

Born and reared in the mining area of Pennsylvania, it is quite natural that Landis selected the study of Mining Engineering when he entered Lehigh University, back in 1898. He received the Metallurgical Engineering Degree in 1902, the Degree of Master of Science in 1906, and the Honorary Degree of Doctor of Science in 1922, all from Lehigh University.

Consultant for Cyanamid

While serving on the faculty of Lehigh University, Landis specialized on combustion furnaces and thermal balance sheets of industrial furnaces. From time to time he was consulted by the American Cyanamid Company on certain problems connected with the production of nitrogen and phosphorous. His interest in these problems was such that he resigned from the University in order to devote his full time to the work of American Cyanamid Company.

Dr. Landis' first task was to assist in the Americanization of the cyanamide process, which had been imported from Europe, where several modifications of the fundamental ideas were striving for place. The adaptation of the crude product to American fertilizer practice, so different from that in Europe, was a complex task, ultimately requiring the organization of an agricultural unit which he directed for several years. Today at Niagara Falls, Canada, is the largest cyanamide plant in the world, and producing the highest grade product of all the thirty or more plants scattered throughout the world.



Dr. Walter S. Landis

In 1914 Landis undertook the synthetic production of ammonia. Again availing himself of the prior teaching that cyanamide, when treated with steam will evolve all its nitrogen in the form of ammonia, he designed a commercial process based upon this principle for the production of ammonia to supplement the by-product ammonia from coke ovens. The first American commercial plant which he erected (1915) was daring in its engineering and its operation involved the solution of many different problems.

Knows Defense Problems

Amidst the present furore over National Defense, it is fitting to pay homage to Dr. Landis for his foresight and invaluable assistance in this field. At the outbreak of the World War, Landis fully appreciated what the Allied governments had been told but refused to believe—that preparedness depends upon an adequate supply of nitric acid.

With characteristic skill and energy Landis almost single-handedly undertook the production of nitric acid or nitrates from ammonia made from cyanamide. His first step was to design and build a small demonstration plant at Warners, New Jersey. Here again new engineering and construction problems had to be solved. Meanwhile Uncle Sam began to feel the pinch of nitrate shortage. The Government sought Landis' aid, and it is no secret that his Warners pilot plant served as the pattern for the mammoth nitrate plant at Muscle Shoals.

Solved Cyanide Problem

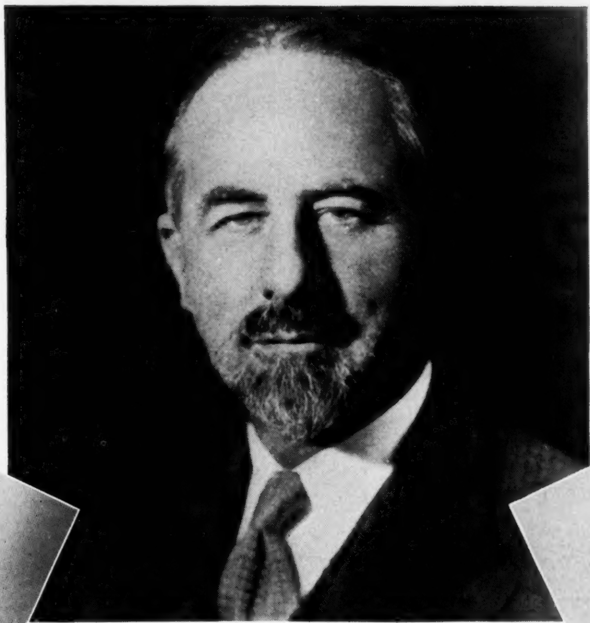
The conversion of cyanamide to cyanide also had been mentioned both in technical and patent literature before Landis entered this field, but the processes described would not yield consistent results and had never been carried beyond laboratory scale. This is another instance, of which there are many in the chemical industry, where somebody discovered a chemical or physical fact, but it took a genius of another kind to put the discovery into practice. Space does not permit recitation of the problems Landis had to overcome, but it is sufficient to say that he solved the problem of commercial production of calcium cyanide direct from cyanamide.

Other ramifications of Dr. Landis' work with cyanamide include quantity production of argon from the residual gases of nitrogen-fixing furnaces used in the cyanamide process; development and production of ammonium phosphate fertilizers; production of picric acid; conversion of cyanide to hydrocyanic acid; production of urea from cyanamide and electrothermic production of zinc.

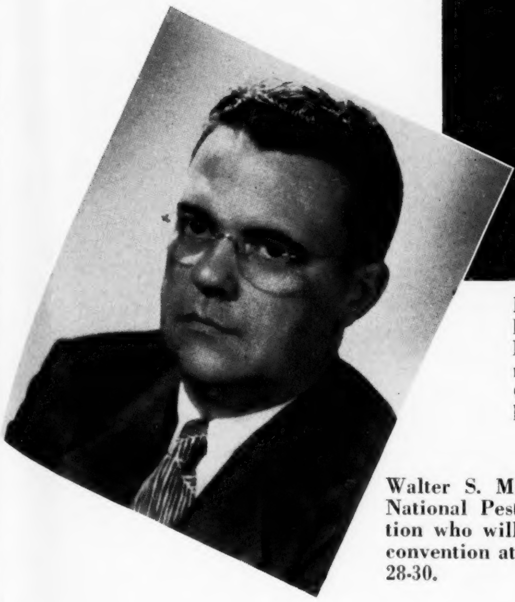
Introductory Work

The technical probems of production were followed by what Dr. Landis considers the equally difficult problem of overcoming public resistance to his improvements. This entailed much educational activity by Landis, so much so, in fact, that in recent years he has released executive control of research save as to general investigations, that he may devote his time to introductory work. This in turn has involved a great deal of travel. For example, in 1938, he travelled more than 40,000 miles. He was in the Belgian Congo when apprised of his selection for the Perkin Medal!

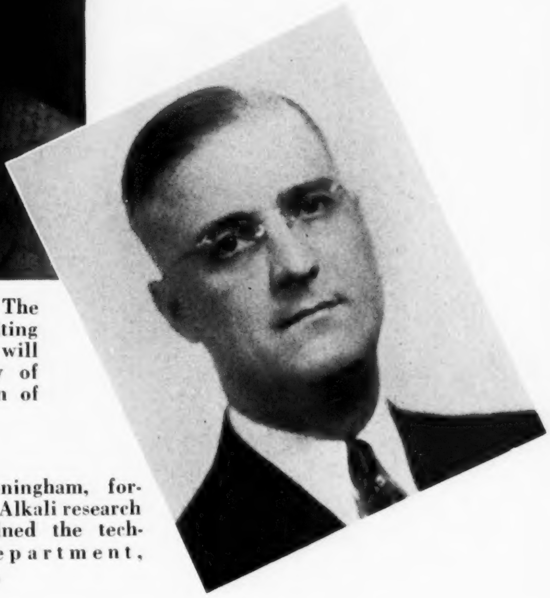
His plain but comfortable offices on the 58th floor of Rockefeller Plaza reflect the modesty of Dr. Landis, while his unassuming attitude puts his most timid visitor at ease. His mild manner belies the unbelievable energy of the man. While the doctor admits no hobbies, on the walls of his office are many photographs taken by him—of a quality which would excite the admiration of professional photographers.



Dr. John Van Nostrand Dorr, president, The Dorr Company, and member of the Consulting Editorial Board of Chemical Industries, will receive the Perkin Medal of the Society of Chemical Industry for 1941, in recognition of his valuable work in applied chemistry.

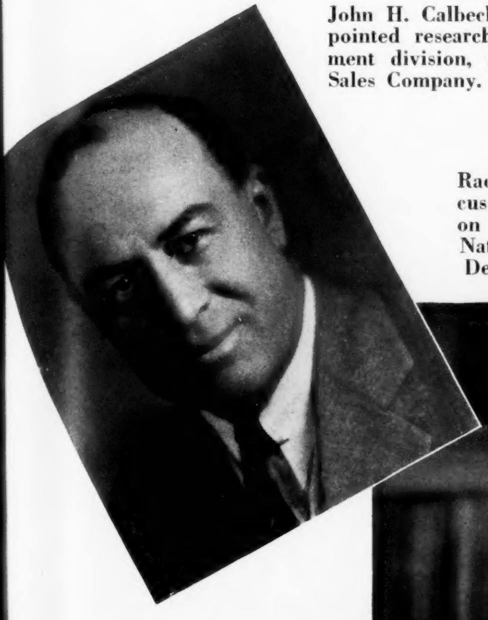


Walter S. McCloud, president, National Pest Control Association who will open the group's convention at Indianapolis, Oct. 28-30.



Dr. G. L. Cunningham, formerly Mathieson Alkali research chemist, has joined the technical service department, Columbia Alkali.

"Headliners" In the News

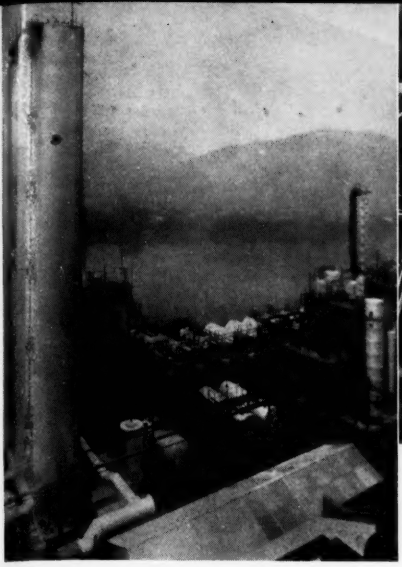


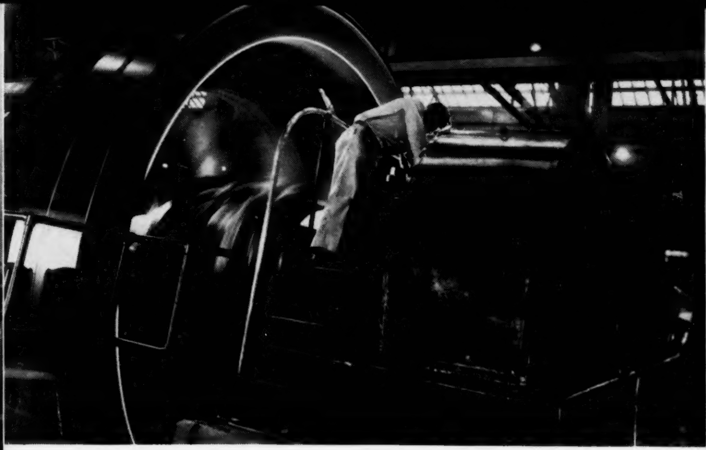
John H. Calbeck has been appointed research director, pigment division, American Zinc Sales Company.

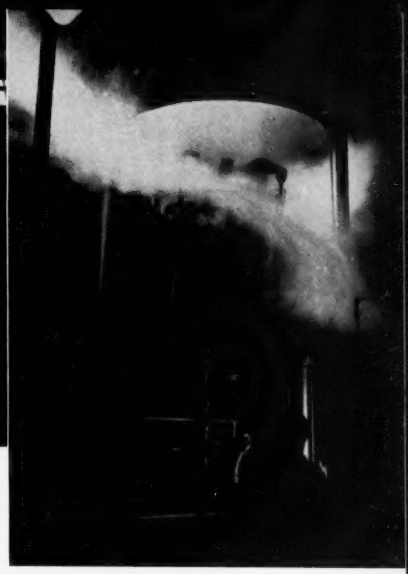
Kurt W. Haeseler has become an associate with Herstein Laboratories, Inc., New York consulting chemists.

Raoul E. Desvernine, president, Crucible Steel, discussed "Industry's Present and Future Responsibilities on National Defense" at the 18th annual conference, National Industrial Advertisers Association, held in Detroit, Sept. 18-20.


DO IT



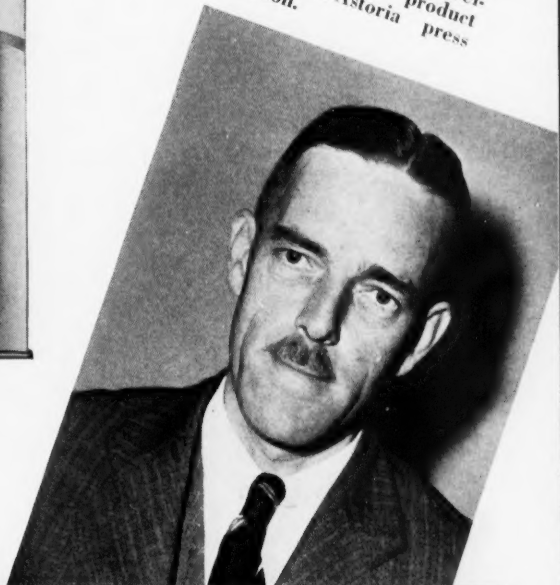




Du Pont's "Zerex" new high-boiling anti-freeze and anti-rust is based on ethylene glycol synthesized at Belle, W. Va., plant (left). Above, powerful compressor at Belle plant used in synthesis of ethylene glycol. Right, generator used to produce gases for manufacture of "Zerex" anti-freeze.

A PRODUCT IS BORN

Dr. R. L. Dodge of Du Pont's Ammonia Department, who described development of the product at Waldorf-Astoria press luncheon.



"Zerex" will be packaged for market by machines such as that shown above.

Dr. H. C. Duus, Du Pont research chemist, has reproduced an automobile cooling system in glass for experimental work on anti-freeze products.

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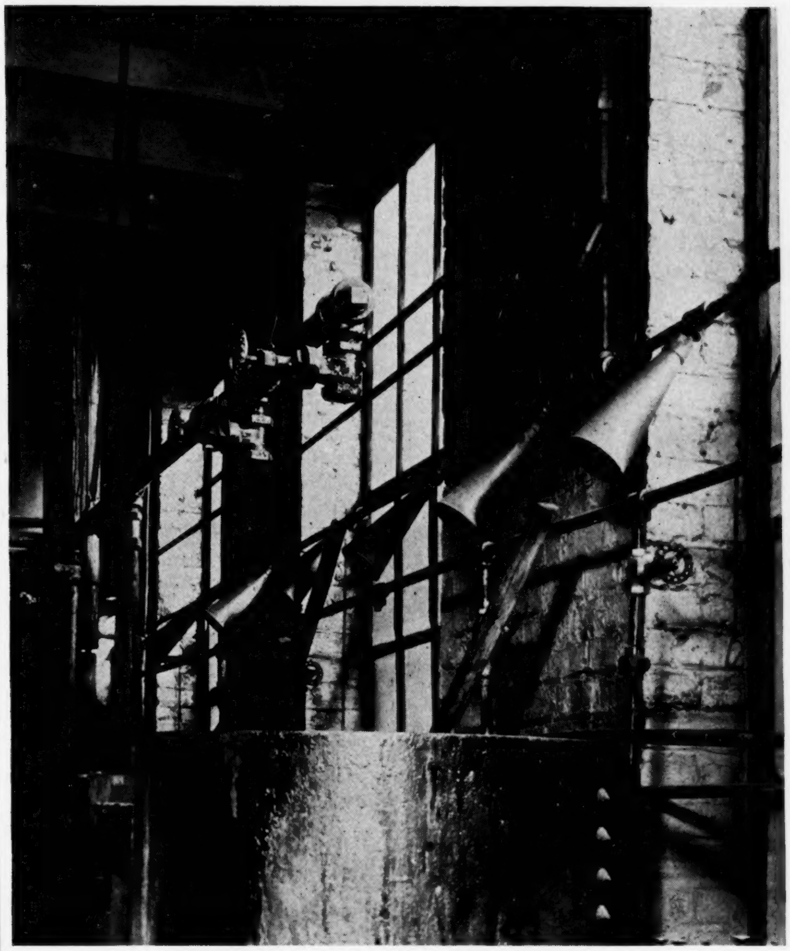
Left—These three young chaps, evidently, have not heard or paid heed to the advice from Washington that the spirit of free enterprise is an outmoded philosophy. They set up this lemonade and soft drink stand on the road leading to the Administration Building of Merck & Co., Rahway, N. J., and did a thriving lunchtime business. There is a touch of real diplomacy in the prominently displayed sign reading: "We use Merck's citric acid." During dull hours, "Brownie" their mascot was left in charge of the stand while the youthful proprietors adjourned to a nearby field for some sand lot baseball.

New York subway cars are now using seat covers made from "Saran" Dow's new thermoplastic resin technically known as Vinylidene Chloride. Chief advantage of the new product is the ease with which it can be cleaned.

Championship soft ball team of the Hercules Powder won 20 out of 21 games in the 1940 Clerical League. Trophy (top right) donated by Sports' Outfitters, Wilmington sport shop, was presented to the team in recognition of their prowess.

Continental Can directors and N. Y. officials at Stock Yards plant, starting comprehensive survey of Chicago units to consider expenditures in a $15,000,000 national expansion program. Front row (l. to r.); J. P. Louderman; J. L. Heinlein, Factory Manager; Sherlock McKewen; W. W. Hodgson; H. F. Bayer; J. J. Engleman; E. B. Dullinger. Second row (l. to r.) H. Bartow Farr; M. S. Sloan; S. J. Steele, Executive Vice-President; J. F. Hartlieb, President; C. C. Conway, Chairman of Board; O. C. Huffman, Chairman of Executive Committee; F. J. O'Brien, Vice-President; F. G. Searle, Vice-President; J. B. Jeffress, Jr., Secretary and Treasurer. Third row (l. to r.): H. A. Goodwin, Advertising Manager; L. R. Dodson, Assistant Secretary; J. S. Snelham, Vice-President; A. V. Crary, Vice-President; Director, Norton Conway; E. J. O'Connor, Manager, General Line Can Sales; H. A. Fink; J. E. Baldwin, Assistant Manager Packer's Can Sales; George Muth, Manager, Commercial Research.

PLANT OPERATION AND MANAGEMENT



Carbon Dioxide Fire Prevention

Carbon dioxide gas systems have been successfully employed for fire prevention in chemical plants. Its use is discussed in the article on the following pages. Photograph shows lacquer room equipped with system, with discharge nozzles located over agitator tanks to direct gas around tanks and to flood entire room, producing inert atmosphere within a few seconds after fire breaks out.

A DIGEST OF NEW METHODS AND EQUIPMENT FOR CHEMICAL MAKERS

CARBON DIOXIDE GAS

As a Fire Prevention Aid

By A. M. Doxsey, *Vice-president, Walter Kidde & Co.*

During Fire Prevention Week, Each October, the Enormous Waste of Preventable Fires Is Brought Home to the American Public. Because Of Its Special Significance To The Chemical Industry, We Offer a Second Article on This Important Subject.

ACCORDING to leading authorities, the principal fire hazards in the chemical industry are heating processes, sparks from friction or other causes, and the ignition and explosion of chemicals and vapors.

Although these hazards vary greatly with the type of process, a large percentage of chemical plant fires are of the flammable liquid type, which present difficult fire-fighting problems. Others result from the production of combustible air mixtures in areas where volatile fluids are processed, and many occur in equipment which presents physical obstructions to use of conventional extinguishing media. All of these fires fall into the group on which carbon dioxide protection now is successfully and widely used.

For fighting chemical plant fires, carbon dioxide is used in two forms—portable units and built-in or "fixed" systems. Both are based on the rapid discharge of gas stored under high pressure—and its function is to dilute the atmospheric oxygen content to a point where fire cannot burn. Because the gas expands some 450 times as it leaves the discharge nozzles, this dilution of the air's oxygen content is extremely rapid.

Portable Units

The best known carbon dioxide extinguishing units are the portable type which consist of steel cylinders ranging in capacity from 2 pounds to 100 pounds and which are equipped with hoses and shielded nozzles to discharge a blanket of gas over a burning surface. The carbon dioxide is stored in these cylinders in liquid form at a pressure of 850 lbs. per sq. inch at 70° F., and upon the opening of the valve it is forced out by its own stored pressure to billow from the discharge nozzles in the form of gas and snow particles. The rapid dilution of the air's oxygen content, coupled with the ability of the gas to move in three dimensions and penetrate past obstructions, makes carbon dioxide one of the most rapid and efficient of all extinguishing agents. Portable units are used throughout the chemical industry wherever a liquid or electrical fire hazard exists, and are equally effective on small laboratory fires or on large spill fires which involve the floor of an entire room.

The second type of carbon dioxide installation is in the form of built-in or fixed systems which are installed near a stationary concentrated hazard to discharge gas into the region of a fire without human direction and therefore without dependence upon human judgment. Such systems, which employ the same type of steel cylinders manifolded to a simple piping system, can be either the "total flooding" or the "local application" type. The former floods an entire room or enclosure with sufficient gas to provide and maintain an inert atmosphere of low oxygen content, while the second type discharges the gas over a burning surface, to dilute the oxygen content of the atmosphere only around the burning materials.

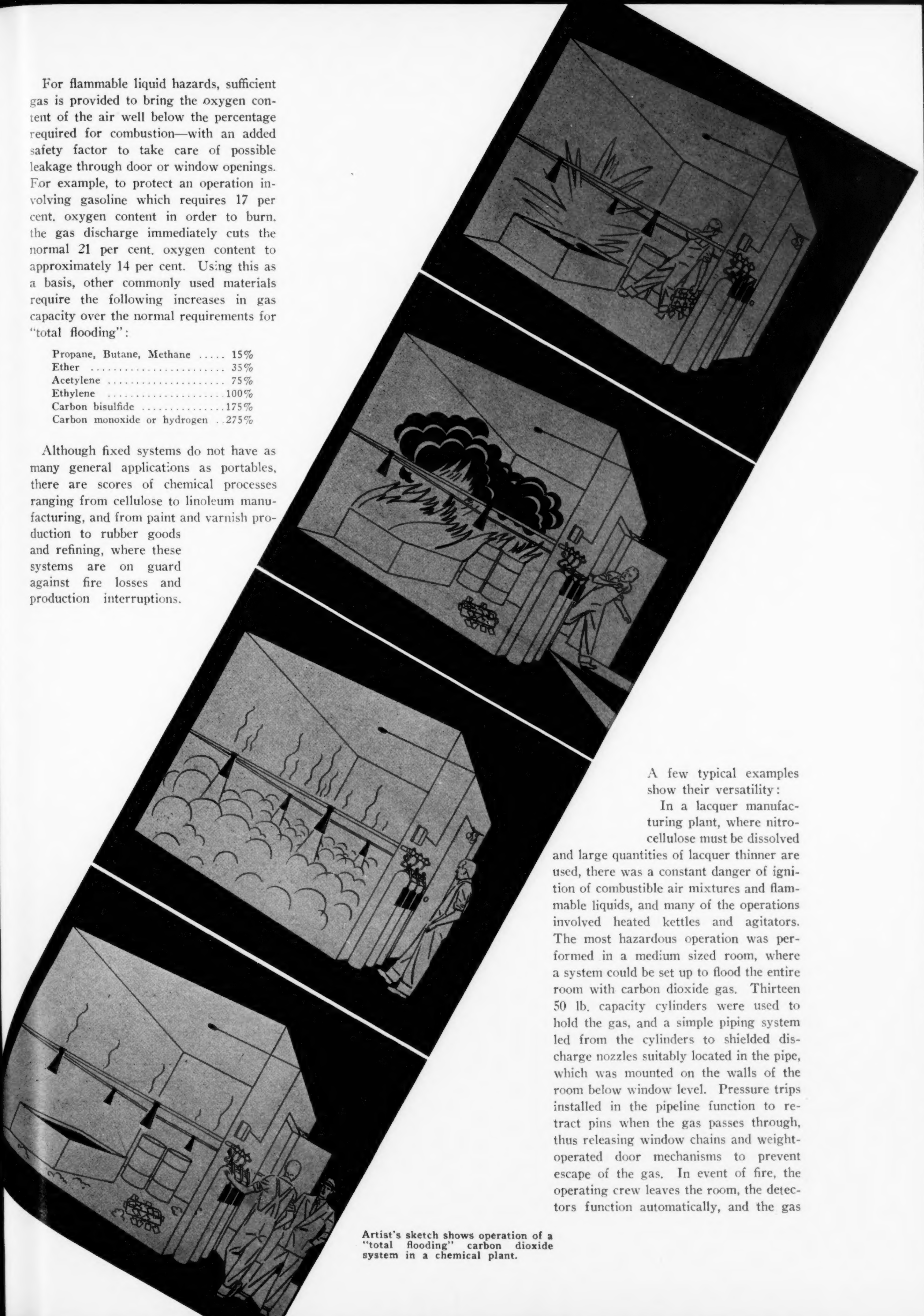
On most "fixed" carbon dioxide extinguishing systems, discharge of the gas is made entirely automatic in order to prevent errors in judgment on the part of panicky employees. On ceilings, or directly over the hazard, are located automatic detectors—most often of the "rate-of-temperature-rise" type. When any temperature rise occurs at a rate higher than that normally expected from weather changes or processing operations, the air in the detectors expands. This expansion operates a diaphragm release device which opens the valves on the gas cylinders, permitting clouds of the gas to billow from discharge nozzles. Where several rooms are protected by the same system, automatic directional valves are employed to direct the contents of the cylinders into the specific room where the fire is burning. This automatic operation occurs within a few seconds after a fire starts, and an inert atmosphere is produced before a fire gains much headway.

Demonstration of carbon dioxide's effectiveness on outdoor spill fires in flammable liquids.

For flammable liquid hazards, sufficient gas is provided to bring the oxygen content of the air well below the percentage required for combustion—with an added safety factor to take care of possible leakage through door or window openings. For example, to protect an operation involving gasoline which requires 17 per cent. oxygen content in order to burn, the gas discharge immediately cuts the normal 21 per cent. oxygen content to approximately 14 per cent. Using this as a basis, other commonly used materials require the following increases in gas capacity over the normal requirements for "total flooding":

Propane, Butane, Methane	15%
Ether	35%
Acetylene	75%
Ethylene	100%
Carbon bisulfide	175%
Carbon monoxide or hydrogen	275%

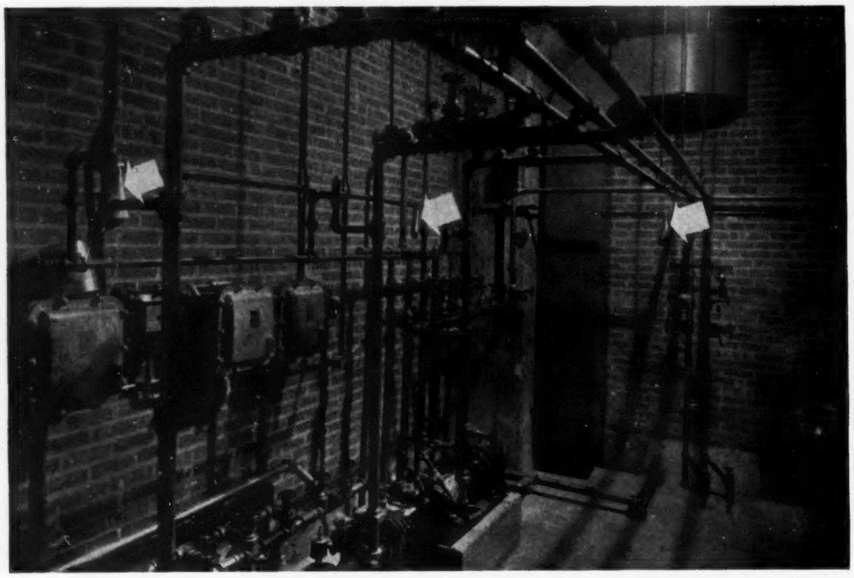
Although fixed systems do not have as many general applications as portables, there are scores of chemical processes ranging from cellulose to linoleum manufacturing, and from paint and varnish production to rubber goods and refining, where these systems are on guard against fire losses and production interruptions.



Artist's sketch shows operation of a "total flooding" carbon dioxide system in a chemical plant.

A few typical examples show their versatility:

In a lacquer manufacturing plant, where nitrocellulose must be dissolved and large quantities of lacquer thinner are used, there was a constant danger of ignition of combustible air mixtures and flammable liquids, and many of the operations involved heated kettles and agitators. The most hazardous operation was performed in a medium sized room, where a system could be set up to flood the entire room with carbon dioxide gas. Thirteen 50 lb. capacity cylinders were used to hold the gas, and a simple piping system led from the cylinders to shielded discharge nozzles suitably located in the pipe, which was mounted on the walls of the room below window level. Pressure trips installed in the pipeline function to retract pins when the gas passes through, thus releasing window chains and weight-operated door mechanisms to prevent escape of the gas. In event of fire, the operating crew leaves the room, the detectors function automatically, and the gas



Solvent recovery room where total flooding system is used. Shielded nozzles affixed to piping system are indicated by arrows.

penetrates to all crevices and corners of the room to extinguish the blaze.

Another hazard existed in a plant producing liquid waxes, and an automatic carbon dioxide system was installed to flood all four floors of the building. Low flash-point liquids were involved in the processes, and on the second floor heaters and agitators reduced the wax to proper consistency for the gravity-feed can-filling operation on the floor directly below. Twenty-four carbon dioxide cylinders were used to store a pre-determined amount of gas, and they were hooked up to a piping system on which shielded discharge nozzles were located on the walls of each room. Thus any one of the four floors is automatically flooded with gas, the directing of which is accomplished by automatic directional valves.

This method of using a centrally-located carbon dioxide supply to protect several hazard points is particularly applicable to chemical plants, and is one that reduces the cost of gas protection. Hazardous processes carried on in rooms scattered over an entire plant can thus be covered by piping systems and valve arrangements controllable from many different points. Although scores of plants employ such arrangements, the clearest picture of how such a system can be extended is found in the case of large cargo ships, where any one of scores of cargo spaces can be individually flooded with the inert gas in event of fire. In the case of ships, the gas is stored centrally in the hold; similarly, a Pennsylvania chemical plant built a special brick building in the center of its properties for the hundreds of gas cylinders which supply gas for the structures surrounding it.

In many plants where flammable liquids are pumped in large quantities, the entire pump house or room is provided with a "total flooding" gas system. In such rooms, firemen with liquid extinguishing equipment are hampered by the many obstructions formed by pumps, motors, and pipelines. Fire from leaks or breaks can frequently cause grave damage when it burns among these obstructions. This is an example of where the three-dimensional action of carbon dioxide enables it to penetrate into all such crevices and around obstructions, quickly smothering the blaze.

A midwest varnish plant recently installed a carbon dioxide system to protect both a wood-stain department and a transformer room with the same battery of cylinders. Basing the amount of carbon dioxide required on the cubage of the largest room, plus reserve, and using the normal standard of 50 lbs. of liquid carbon dioxide for every 1000 cubic feet of contained air, they installed fifteen 50 lb. cylinders with automatic directional valves to discharge an adequate supply of gas into either room in event of fire. A connected reserve battery was also installed as an additional safety factor and for use in the event that two fires occurred simultaneously in the adjoining rooms. This reserve also serves as a standby while the main cylinders are being recharged after a fire.

In another plant where flammable solvents were used in mixing tanks, the "local application" method was used. The discharge nozzles extend through the hatches of the mixing tanks to discharge the gas into the air space above the burning liquid. In this case, accidental spill fires which could spread beyond the tanks are highly improbable, but large portable carbon dioxide units are provided to cope with such an eventuality.

In an eastern cellulose acetate plant, the hazard of combustible air mixtures from acetone and other low flash-point liquids provided an unusual problem. Despite all precautions, this air mixture could be touched off by a static or electrical spark or a spark from metal-to-metal contact, and because several adjoining rooms were involved flame propagation could take place before fire-doors were closed. It was decided that a large automatic carbon dioxide system could quickly provide an atmosphere inert to combustion, to stop flame propagation and to prevent large quantities of liquids from becoming involved. Although the usual water sprinkler equipment has long been installed in this plant, the major fire protection system now consists of nearly three tons of carbon dioxide. Another 2000 lbs. of carbon dioxide was installed in the form of portable extinguishers, which are located at strategic points for use on localized fires in flammable liquids or electrical equipment when discovered in the incipient stage.

Use On Electrical Hazards

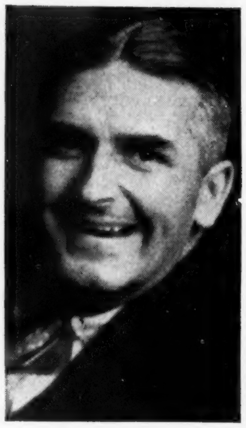
Another use for this compressed gas is to combat fires in transformer vaults, circuit breaker rooms, and other electrical equipment. Total flooding systems are normally used on such hazards—often coupled with such precautions as isolation of equipment, stone-filled pits and ramped sills—and fires in such equipment are immediately extinguished without damage to windings or insulation. The dryness of the gas discharge, coupled with its ability to penetrate three-dimensionally through windings and crevices to the seat of a fire, makes it especially valuable on electrical fires of all types. Also, its dielectric strength is higher than that of air—an added safety factor.

In electrical equipment rooms where fire-doors cannot be used or where ducts might permit the spread of fire, "screenings nozzles" are usually employed to project jets of the gas across the openings, shutting off the oxygen supply as effectively as a door or damper. And, by the use of trips in the piping system, the discharge of the gas can also be made to shut off motors, fans, pumps, where their continued operation might contribute to the duration or severity of the fire.

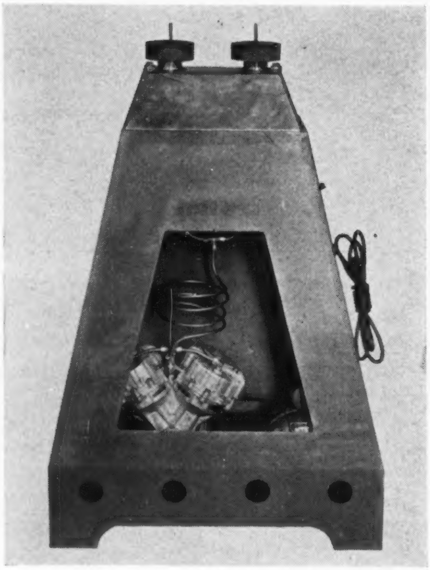
Carbon dioxide extinguishing should not be considered as a replacement for sprinklers, for in most plants where gas systems are used, automatic sprinklers are retained. However, in many chemical plants where flammable liquids are involved, it must be remembered that the effectiveness of automatic sprinklers over flammable liquids depends upon the flash-point, temperature, and the quantity of the liquid involved. On low flash-point liquids particularly, auxiliary protection in the form of such special extinguishing devices is specifically recommended by fire protection authorities.

Shipping and Container FORUM

By R W Lahey



IMPROVED AIR CLEANER FOR BOTTLES



IMPROVEMENTS made in the Model E Z 2-Tube Air Cleaner, introduced to the bottling and packaging trade a few months ago, have been announced by the U. S. Bottlers Machinery Company.

They recommend the cleaner for the removal of carton lint, dust, etc., from new bottles received in shipping cartons.

Improvements made in the cleaner are in the motor mounting and the compressor which furnish the air supply necessary for the removal of the foreign materials.

One of the major improvements in the cleaner is the installation of a 100% oil free compressor. This new compressor, is a V-twin of the diaphragm type as illustrated. It insures clean oil free air because it has no oil pumping pistons, cylinder walls or other oily surfaces with which the air comes in contact.

The new compressor crankshaft is equipped with precision ball bearings which have been grease packed and sealed at the factory. This construction replaces the old sleeve type bearings running in a bath of oil in the crankcase of the compressor.

By mounting the motor and compressor on a common base and by suspending them from the sides of the cleaner by means of springs it has been possible to eliminate compressor vibration and belt noises formerly transmitted to the cleaner base.

An automatic belt tightening device has been incorporated in the new unit to keep a constant belt tension on the compressor drive. The new method of taking up slack is accomplished by mounting the motor on a pivoted base. This base is attached to the main compressor base and the action of a tension spring keeps the belt tension constant at all times. The spring tension against the pivoted base of the motor holds the motor back on the pivot, thus increasing the distance between the belt pulley and the motor pulley, keeping the belt taut.

This low cost bottle cleaning unit known as the Model E Z 2-Tube Air Cleaner is manufactured and sold by the U. S. Bottlers Machinery Company, 4010 North Rockwell St., Chicago, Illinois.

Door Bracing For Shipping Bagged Products

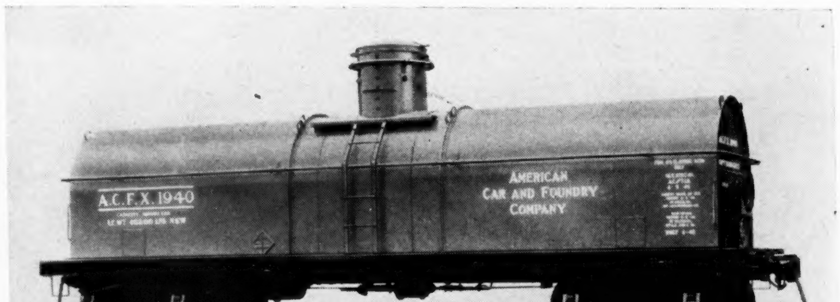
A source of irritation to carload shippers of bagged products is the complaints which occasionally arise from damage to bags adjacent to car doors. Although the rows of bags are "pulled in" at the doorways to prevent snagging and chafing against door posts and the upper tiers of bags are "stepped back" and interlocked, unusual swaying of the cars in transit or severe switching impacts, tends to topple one or more bags off the pile and against the car door. If this happens, the bags may be chafed or snagged if resting against the door and when it is opened the bags are torn and often mangled.

The illustration shows a method of door bracing for a carload shipment of bags of table salt devised by Signode Steel Strapping Company which will prevent such damage.

Monsanto Using Aluminum Alloy Tank Car

The Merrimac Division of the Monsanto Chemical Company has a riveted aluminum alloy tank car in service transporting 95% nitric acid. This test was authorized by the I. C. C., and for protection they have specified that it be enclosed in a steel shell during the experimental period. It is hoped that this restriction will be lifted as the aluminum alloy has adequate tensile strength.

This car, as well as three others of similar construction now being fabricated, was built by the American Car and Foundry Company.



NEW EQUIPMENT

New Mask — QC 87

A new moulded rubber mask has recently been announced. Wide vision in all directions is claimed by the manufacturer and yet lenses of the mask are set at such an angle that there will be no reflections on one lens to obstruct vision when the light is coming from the opposite side. The use of flat lenses of shatter-proof glass insure undistorted vision. The outline of the mask is such that it will fit all sizes and shapes of faces, according to the manufacturer, and make a tight seal with but slight tension of the head straps, which makes for comfort. The small dead air space within the mask makes for a minimum of rebreathing, thus

lessening the tiring effect of wearing the mask over long periods. This is of particular importance when mask is used with canisters. The clarifying tubes, through which the incoming air is passed over the lenses, are integrally moulded into the mask.

The low resistance of the exhale valve insures the minimum of fogging of the lenses on exhalation which is immediately followed by a prompt clearing of the lenses on inhalation.

New Compact Balance — QC 88

A new low priced, compact balance, that can be readily dismounted and stored in a laboratory drawer has been designed to meet the needs of all balance technique, and at a price within the reach of the student in chemistry. It is supplied with brass weights. In use, the upright beam support is inserted into a metal socket in the box and the beam placed upon it. An eccentric beam release brings the pans to rest. Capacity is 100 grams; sensitivity 5 mg.; beam, 7.25 inches long with steel knife edge; support for beam is an agate bearing. Pans are 3.25 inches in diameter, and are notched to support test tubes.

Dial Thermometer — QC 89

A recent addition to a well-known line of temperature recording equipment is this new mercury-actuated dial thermometer. Intended for wall or flush mounting the case is constructed of iron, usually with baked rubberized finish although other finishes such as polished brass, nickel-plate, chrome-plate, etc., may be had. There are many uses for instruments of this type, with flexible

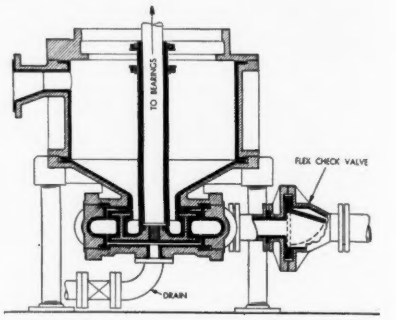
tubing connection, whose working parts operate freely and record accurate temperatures. The 8-inch dial with non-reflecting white finish and large black figures, is easily read. All standard temperature ranges are furnished.

Packless Pump — QC 90

The Packless Pump, as its name implies, requires no packing, thus it has no stuffing box, no gland and, further, it has no liquid seal and no mechanical seal. All parts have the strength of steel, but those in contact with the solution being pumped are totally covered with soft, resilient maximix rubber or Neoprene for corrosion and/or abrasion resistance. Since there is no gland seal in the Packless Pump, the often objectionable dilution from this source is eliminated. Further, this avoids leakage and waste of solution at the stuffing box of some conventional pumps.

The Packless Pump is a positive feed centrifugal pump and consists primarily of a maximix rubber or Neoprene lined feed tank with the pump itself directly beneath.

The design provides for operation with the feed equal to or less than the full capacity of the pump, as regulated by a variable pitch, V-belt drive. This makes it possible to pump under widely fluctu-



ating conditions. A Flex-Check Valve lined with soft, resilient maximix rubber or Neoprene is designed to cause little friction loss when open, yet it holds tightly against back pressure.

Fire Gun — QC 91

Approval by the Underwriters' Laboratories of a pistol-grip carbon dioxide fire extinguisher has recently been announced. The sixteen-inch-high, trigger-operated extinguisher, which throws out a blanket of gas and "snow" to smother fire by robbing it of oxygen, was rated B-2-C-2 by the Underwriters.

Designed for use on small and incipient fires where instant action and maneuverability can prevent them from reaching dangerous proportions, this extinguisher can be used safely on electrical fires with-

out fear of grounding, and the dry and non-poisonous gas cannot harm delicate materials. It is specially recommended for laboratory fires, or fires in electrical equipment or small quantities of flammable liquids.

Chemical Industries
522 Fifth Ave., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

QC 87 — QC 89
" 88 — " 90
QC 91

Name ....

Title .... **Company** ....

BOOKLETS AND CATALOGS

Chemicals

A221. Caustic Soda; 56-page booklet on manufacture, properties, reactions, technical forms, handling, equipment to be used, and other pertinent information on caustic soda. This booklet also contains data and charts which are being published for the first time and should prove of interest to anyone using caustic soda. Michigan Alkali Co.

A222. Chemical Digest; Folder of interesting items concerning chemical matters. Foster D. Snell, Inc.

A223. Glycols; Presents properties, uses and possibilities of this organic family. Includes ethylene glycol, several polyethylene glycols, propylene glycol, and dipropylene glycol with table of reference data on commonly used physical constants and solubilities. Carbide & Carbon Chemicals Corp.

A224. Merck Chemicals; Oct., 1940. Price list of medicinal, analytic, technical and photographic chemicals. Merck & Co., Inc.

A225. Paint Progress; Vol. 1, No. 4. Contains articles on painting asbestos shingles, paints for porous surfaces, precautions in painting acoustical wall board, zinc dust primers for steel, painting damp water pipes. The New Jersey Zinc Co.

A226. Petroleum Sulphonates; 15-page booklet giving chemical description of petroleum sulphonates, properties, characteristics of different types, and uses in a number of products. Petroleum Specialties, Inc.

A227. Plant Food Consumption in the United States in 1939; A survey just published on fertilizer consumption in U. S. by grades and materials. Comprehensive information on plant-food ratios and related subjects. The National Fertilizer Association.

A228. Salts of the Platinum Metals and Gold; 12-page booklet includes description, formulae and properties of above mentioned compounds. Baker & Co., Inc.

A229. Sugar Refining with Activated Carbon; 14-page booklet concisely describes use of activated carbon in sugar refineries with resultant economies in plant investment and time, together with higher crystallization yields. Darco Corp.

A230. The du Pont Magazine; Sept., 1940. Lammot du Pont on "The Need for Leadership." Also articles on modern package design, brush-bristle problems, dye exhibit at World's Fair; Anaconda's copper mines at Butte, research in pest control and several other items. du Pont de Nemours & Co., Inc.

A231. The Pioneer; Sept., 1940. 12-page booklet features "How Liquid Chlorine Solutions are Better Handled in Neoprene Hose." Other new developments in products and equipment are briefly described. Electro Bleaching Gas Co. and Niagara Alkali Co.

Equipment—Containers

E322. Bottling Equipment; Bulletin No. 4 describes service in factory rebuilt bottling equipment and illustrates several models ready for shipment or in process of rebuilding. Crown Cork and Seal Co.

E323. Bufflovak; 20-page booklet of description, illustration and specification on modern processing equipment, such as dryers, kettles, evaporators, solvent recovery apparatus, pilot plant equipment and other chemical plant equipment. Buffalo Foundry & Machine Co.

E324. Electronic Devices For Industry; 20-page booklet briefly lists some of more important vacuum-tube apparatus and describes its application and method of operation. General Electric Co.

E325. Engineering properties of Monel; Contains much detailed and comprehensive data on composition, properties, etc. The International Nickel Co., Inc.

E326. Gasket Handbook; 64-page handbook and catalog on industrial gaskets. Gives size and price information. Well illustrated. Goetze Gasket & Packing Co., Inc.

E327. Fire Extinguishers; 8-page illustrated bulletin on built in carbon dioxide fire-extinguishing systems. Bulletin contains photographs of systems in various types of factories and describes problems in adapting this method of fire protection to various industrial hazards. Also included are 15 diagrams of typical installations, with engineering drawings. Walter Kidde and Co., Inc.

E328. Pneumix Agitators; folder of various types and sizes of air-motored, explosion-proof agitators. Eclipse Air Brush Co.

E329. Quick Selector Catalog; Sept., 1940. 64 pages of reading matter, illustrations and specifications that simplify selection of electrical equipment. Westinghouse Electric & Manufacturing Co.

E330. Schneible Equipment; Bulletin of dust collectors, entrainment separators, pumps, dewatering and settling equipment. Claude B. Schneible Co.

E331. Single-Stage Turbo Blower; 24-page Bulletin B. 6048 illustrates and describes blowers for use throughout industry where large volumes of air or gas are needed at pressures from 1 to 6.25 lbs.

E332. Small Motor Selector. Illustrated folding sheet as a guide to correct application of small motors. Westinghouse Electric & Manufacturing Co.

E333. The Working of S.A.E. Nickel Alloy Steels; 15-page reprint from the *American Machinist* thoroughly discusses above mentioned subject. International Nickel Co.

E334. Twin-Weld Hose; Folder describing a patented construction putting both the acetylene and oxygen lines into one easily handled unit. Hewitt Rubber Corp.

E335. V-Belt Data Book; 170-page book gives alphabetical listings of belting requirements for large number of applications. B. F. Goodrich Co.

E336. Vibro-Insulators; Bulletin describes combinations of rubber and metal used to eliminate vibration. B. F. Goodrich Co.

E337. Wire Rope; Folder discussing internal lubrication to guard against internal friction and corrosion in wire ropes. Macwhyte Co.

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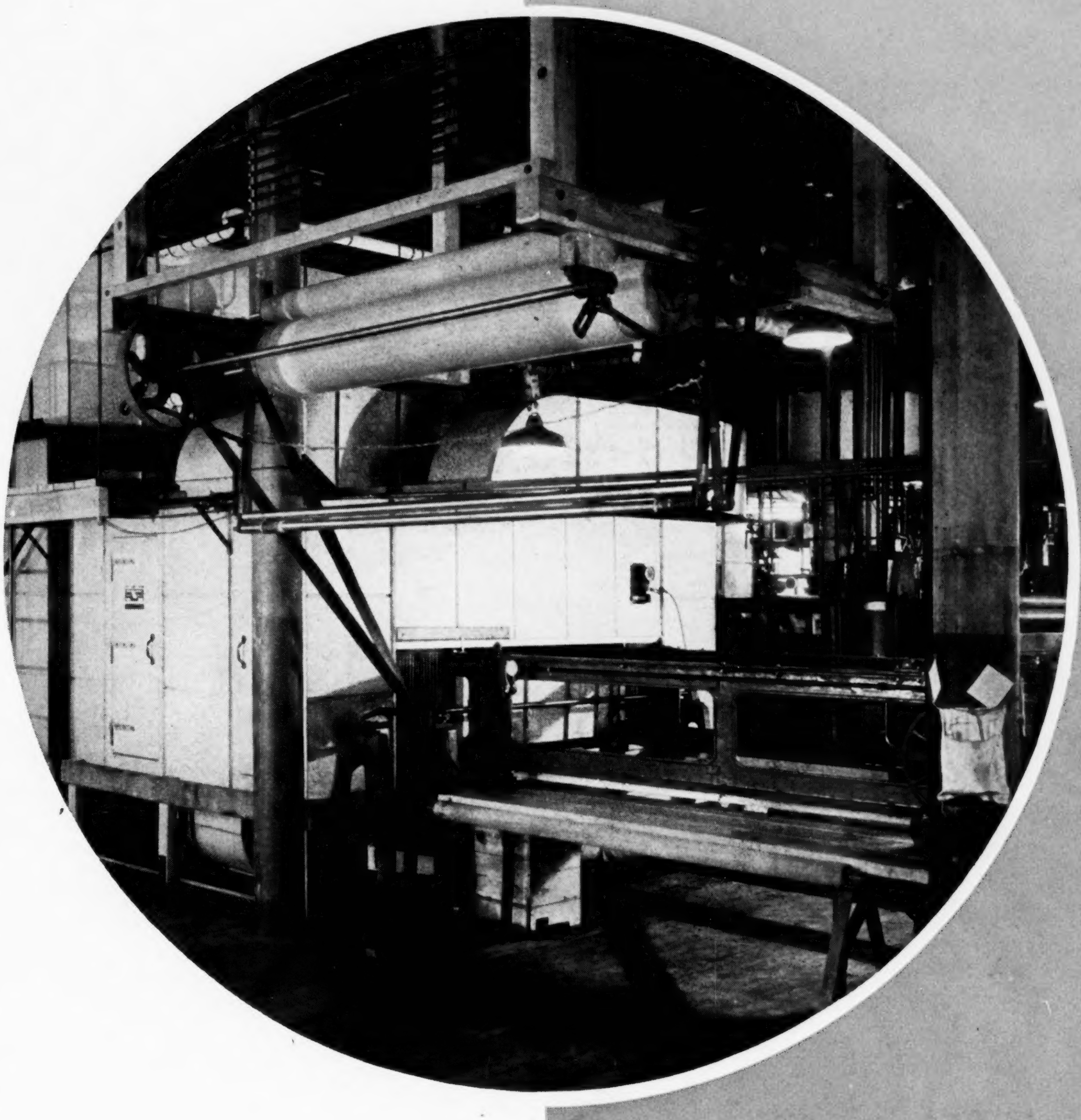
NEW CHEMICALS FOR INDUSTRY

The "Zelan" process for making textiles water-repellent is discussed in a comprehensive article on the following pages. Photograph shows a return pass tenter for processing heavy goods like corduroys and worsteds. It is shown through courtesy of Andrews and Goodrich, Inc., Dorchester, Boston, Mass.



Digest of Chemical Developments in Converting and Processing Fields

CHEMICAL INDUSTRIES

WATER-REPELLENT TEXTILES

Through the new "Zelan"* Process

Chemical History Is Replete with Developments of New Methods for Performing an Old Task. However, Such Methods Usually Are Closely Guarded Secrets until Perfected. The Zelan Process Is Different. Here Is Its Story.

SUCCESS stories are always interesting. We could, and should, have more of them in chemistry. Too often the story cannot be told and only the result is published. The story of the development of Zelan is important to all chemists, even those not at all interested in textiles, for the reason that in this case it is possible to follow some of the many steps in the gradual evolution, over a period of years, of a complex series of chemical processes resulting in a practical process now in industrial use in a number of plants. It is a part of the history of chemistry in which many chemists, and groups, played important parts without sitting in at the end. Such is the history of many, perhaps most, important industrial developments.

The Zelan process is a new and better method of attaining an old well-known result, that is, the so-called "waterproofing"† of fibers and fabrics. The previously-known waterproofing processes were discussed in CHEMICAL INDUSTRIES but the process is so new, interesting and different, and offers so many possibilities for further development in the textile and other fields, that the Zelan waterproofing process will be discussed separately.

By

Chas. E. Mullin

D.Sc.

Consulting Chemist

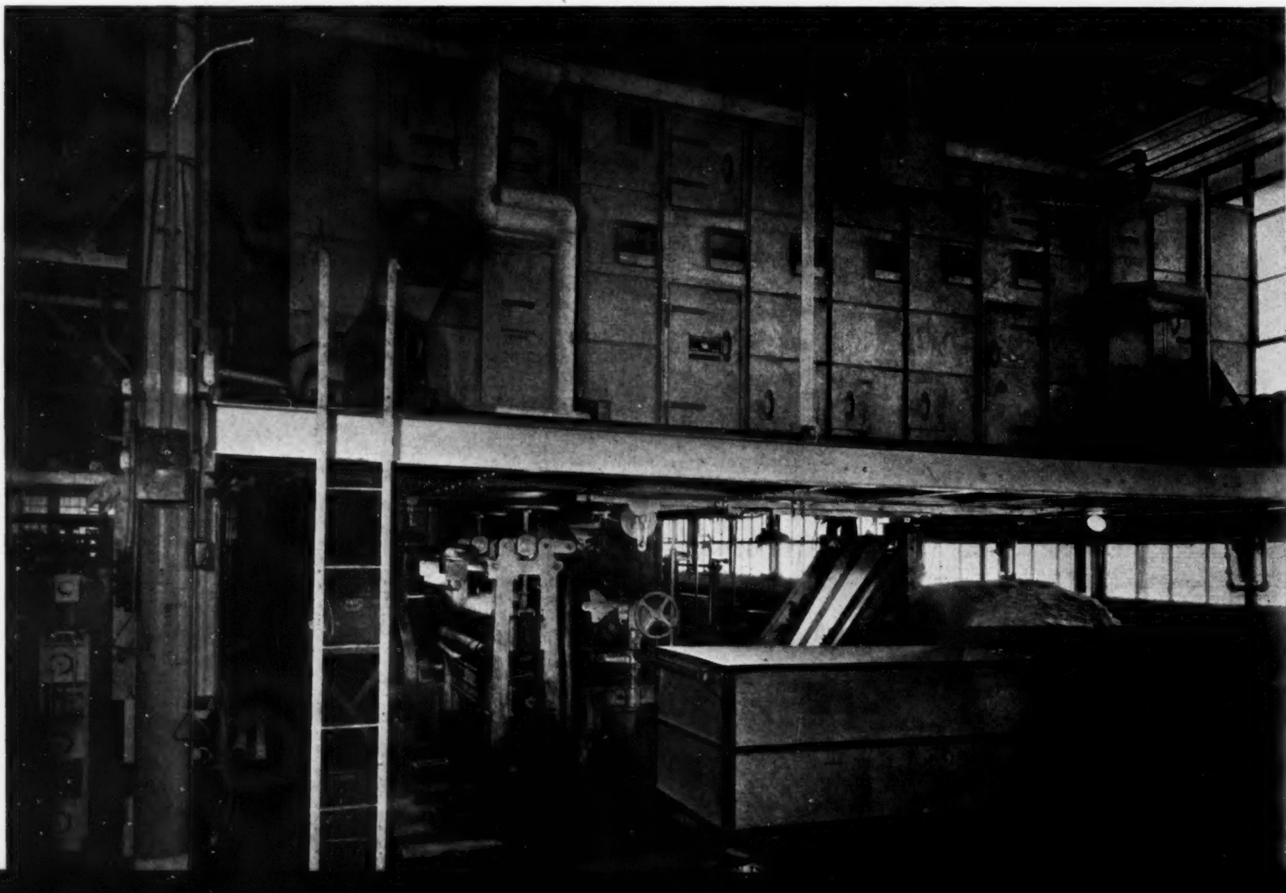
The fundamental idea back of the Zelan process, that is, the formation of chemical compounds of the textile or other fibers with certain reagents, in the yarn, fabric, or otherwise, is not new but, until the Zelan process, it has been absolutely impossible to, in any suitable manner, control these highly sensitive and complex reactions in textile finishing plants on an industrial scale. The commercialization of the Zelan process has opened an entirely new field of textile chemistry. The flood of recent patents along this line indicates that this particular process is only the first of many new chemical processes for the textile and other more or less related industries.

The Zelan process is the result of some very clever thinking on the part of some Imperial Chemical Industries chemists, in the expansion and application of a chain or series of ideas developed elsewhere and for a quite different purpose. It is a fine example of the fact that no one individual

* The word Zelan is the registered trade-mark of E. I. du Pont de Nemours & Company of a chemical product developed by Imperial Chemical Industries, of England, for use in softening and rendering textiles and some related materials water repellent. The same product is marketed in England and other countries, by Imperial Chemical Industries, under the English registered name or trade-mark Velan. The following discussion applies to both the Velan and Zelan durable water-repellent finish. As the present paper is prepared primarily for Americans, the American name, Zelan, is used throughout.

† In the strict meaning of the word, waterproof, Zelan renders the fibers, yarns, fabrics, etc., water-resistant or -repellent, rather than waterproof.

Continuous curing and drying unit. One of the inherent requirements of Zelan process is the necessity of drying uniformly prior to curing, and of heating quickly and uniformly up to curing temperature. (Photographs used with this article, courtesy of Andrews and Goodrich, Inc.)



—or group—has a monopoly on any one line of research, even though they may have given it a great deal of time, thought, and effort. It shows what can be done with an idea, developed elsewhere. Very often the other fellow, quite outside of the original research group, may have an even more valuable idea regarding the application of a reaction or process than those so close to the original development. In other words, sometimes "we can't see the woods for the trees." The story of Zelan is an excellent example of the possibilities of applying real chemical research to a textile finishing problem.

Earlier Ideas

In all previous textile waterproofing processes, the hydrophobic materials were deposited in or on the fibers or fabric. There was no chemical reaction or union between the fibers and the repellent materials. As indicated above, the idea of esterifying or otherwise chemically altering cellulosic fibers, or the external surface of these fibers, to modify or alter their dyestuff affinity, hydrophobic, and/or other properties is not new. Numerous patents have been issued along these lines and a certain amount of success was attained with these processes, mainly in the laboratory.

Such partially (surface) esterified, or otherwise chemically altered, fibers have many new, widely varied and desirable properties, depending upon the composition of the acidic component, the extent, degree and conditions of esterification or other chemical reaction, etc., but in every case the process of esterification has been both expensive and difficult to handle or control. Immunized cotton, a product of a subsidiary of the Sandoz Chemical Works, of Basle, Switzerland, is one of the very few products of this type that has ever come into anything approaching wide use in the textile industry. Even this immunizing process is not suitable for use in the usual textile plant. The product (immunized yarn) is prepared in a special plant and marketed to the textile mills, etc., as the esterified—immunized—and often dyed product, ready for use.

In the same way, many cellulose esters, ethers and other compounds have been used as coating and impregnating materials on textiles and a wide variety of other things. Certain cellulosic lacquers, varnishes, dopes, etc., have long been in use on aeroplane fabrics, "oiled" silks, water- and perspiration-resistant fabrics, etc., but these compounds were in physical contact only, not in chemical combination with the fiber itself. The manufacture of these cellulose esters and other compounds, either on the surface of the fibers as in the two paragraphs above, or as the complete reaction of the cellulose present, is very difficult to control and these compounds were practically always prepared in strictly chemical plants, never in the routine finishing of textiles in the ordinary textile finishing plant.

The Zelan process is the first waterproofing process of the strictly chemical type to be used commercially in textile finishing plants. It is the first process of this type that is both simple and practical enough for use in properly-equipped textile finishing plants and sufficiently low in cost to permit its use commercially.

General Method

In the Zelan process, the Zelan compound, applied to the goods in aqueous solution or dispersion, on later treatment (drying and heating) of the goods, combines with the carbohydrate (cellulose) or protein (wool, silk or leather) molecule of the fiber to form a true chemical compound with the fiber (surface?) itself.

The Zelan process can be considered an esterification process but the final product is so complex that it can also be considered as belonging to other groups or classifications. This will be considered later. The secret of its commercial success is that the application process is so simple and completely under control that it can be, and is, applied in the textile processing or finishing plant, under proper technical control, without difficulty. It is applied from an aqueous solution or dispersion, and no solvents are used at any point in its application to the fiber. Theoretically, it is applicable to all textile and some other fibers, including the protein fibers, silk, wool and leather, as well as to the cellulosic fibers, even including paper and viscose film, but in actual practice at this time it appears to be much more widely used on the cellulosic fibers, cotton, rayon, linen, etc., than on wool, silk or leather. In every case, where the final process (heating) is completed, the process results in a true chemical union, apparently between the hydroxy group of the cellulose, or a nitrogen atom of the protein molecule, and the Zelan molecule, to give a water-repellent effect that is fast to washing, wear, perspiration, light, heat, dry-cleaning, etc. The Zelan process is not cheap, but offers certain definite advantages over any waterproofing product or process ever before offered to the industry or consumer. Aside from its waterproofing effect, the Zelan treatment softens the material, which effect is also permanent. In fact, it finds some use as a permanent softening agent where the water-repellent effect is not necessary.

Recently, the textile-consuming public has become conscious of more durable textile finishes, the so-called "permanent"*

* Actually, no textile finish is "permanent." It can hardly be any more permanent than the textile material itself and few of the present so-called permanent finishes will last as long as the fabric. For all practical purposes, a "permanent" textile finish is one which is still present, when the useful life of the textile material is exhausted, in an amount sufficient to exert its specific properties or characteristics to the textile material.

finishes. Then, too, our gradual change in the methods of cleansing all types of garments, etc., with the tremendous increase in solvent or dry-cleaning in all parts of the world, and especially in the United States, has developed a demand for softening, waterproofing and all other textile finishes that are fast to dry-cleaning, as well as to water washing and other factors encountered in use.

Most chemists are familiar with the fact that the cellulosic fibers, cotton, linen, rayon, etc., probably have very little chemical affinity for dyestuffs, etc., and it has long been an object of textile research to increase the affinity of the cellulosic fibers for certain dyestuffs, such as the azo (acid and direct) dyes, or to in some way increase the washing fastness of the direct colors of the fibers so as to obtain colors of fastness comparable, or superior, to those obtained with the vat and azoic or naphthol AS products, at lower costs.

One method of increasing this color fastness, to washing, would be to increase the chemical activity of the cellulose molecule to the point where it would chemically combine with the dyestuff, to form a large and water-insoluble fiber-dyestuff compound. One of the most frequently suggested methods of increasing the chemical affinity of the cellulosic fibers, for dyestuffs, such as those containing a reactive acidic group, is to give the cellulose molecule basic properties, as by the introduction of an amine group, to form amino-cellulose. There are several methods by which the desired amino-cellulose can be formed and a number of patents have been granted covering processes of this type but, for numerous reasons, including cost, none of these processes have been adapted for commercial use, even on a small scale.

In some of the processes for the production of basic cellulose, by the introduction of amino group into the molecule, for example, those covered by British Patents No. 249,842 and No. 263,169, the purified cotton (cellulose) is treated with an inorganic alkali in organic solvent solution, such as an alcoholic solution of sodium hydroxide, to form soda-cellulose. This soda-cellulose is treated with an organic sulfochloride, such as p-toluene- or benzene-sulfochloride, in an organic solvent, to give cellulose-sulfonic acid esters, the "immunized" cotton previously mentioned. The name immunized cotton comes from the fact that the acid cellulose compound formed above is immune to, or is no longer dyed by, the direct dyes so widely used on cotton. (Most direct dyes are azo sulfonic acids, or salts of these acids.) On treating this cellulose-sulfonic acid ester with ammonia or certain other organic bases, it is possible to introduce an amino group into the cellulose molecule, obtaining a basic, amino-cellulose.

Later it was discovered, British Patent No. 284,358, that the basic cellulose compound could be prepared by a simpler process, wherein the alkali-cellulose is treated directly with the organic sulfochloride in the presence of tertiary amines. It is believed that this reaction may be:

$$\text{Cellulose—O—SO}_2\text{—R}_1 + 2\overset{\displaystyle R_2}{\underset{\displaystyle R_3}{|}}\!\!\!\!\text{NH} = \text{Cellulose—}\overset{\displaystyle R_2}{\underset{\displaystyle R_3}{\text{N}}} + \text{H—}\overset{\displaystyle R_2}{\underset{\displaystyle R_3}{\text{N}}} < {\text{H} \atop \text{O—SO}_2\text{—R}_1},$$

where R_1 is a hydrocarbon radical, such as p-tolyl, and R_2 and R_3 are either hydrogen or hydrocarbon radicals. However, it is possible that the cellulose-sulfonic acid esters can also react with tertiary amines to form addition quaternary ammonium compounds, as shown below:

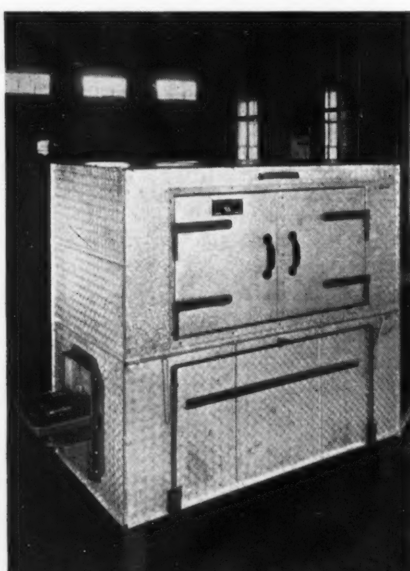
$$\text{Cellulose—O—SO}_2\text{—R}_1 + \text{R}_3\text{—}\overset{\displaystyle R_2}{\underset{\displaystyle R_4}{\text{N}}} = \text{R}_3\overset{\displaystyle R_2}{\underset{\displaystyle R_4}{\text{N}}} < {\text{Cellulose} \atop \text{O—SO}_2\text{—R}_1}$$

The basic amino-cellulose compounds formed have a decided affinity for dyestuffs containing a sulfonic or other acidic group, and undoubtedly form true chemical compounds with these acidic dyestuffs. See Mullin, *Textile Colorist 53*, 834-7 (1931).

The quaternary ammonium compounds have been used to aftertreat direct dyed cellulosic fibers, such as cotton, to increase the fastness of the direct colors on the fiber. A number of patents have been granted along this line, mostly to European inventors, and at least one product, Fixanol of Imperial Chemical Industries, appears to be very similar to Zelan, but it is doubtful whether any of the Fixanol-type products combine with the fiber in exactly the same way as Zelan. Probably most of them react chemically with the dyestuff molecule, to give a larger and more water-insoluble dyestuff compound, rather than with the fiber. See British Patents No. 390,553, No. 396,992, No. 434,911, and many others.

A Later Idea

British Patent No. 426,482, accepted March 28, 1935, to the Deutsche Hydrier-



Left—Test dryer for samples. Below Single pass tenter for treating light weight goods, such as cotton goods for ski jackets.

werke A-G., one of the recent developments in amino-cellulose production, disclosed a new idea and showed that basic cellulose can be prepared in a quite different manner, that is, by subjecting cellulose to the simultaneous action of either aldehydes or ketones, or certain of their derivatives, and pyridine bases, or the salts of such bases with strong acids. Suitable aldehyde and ketone derivatives are those in which the oxygen atom is replaced by halogen, organic or inorganic acid radicals, hydroxy, alkoxy, or cycloalkoxy groups The term "pyridine bases" includes pyridine and its homologues, and the condensed pyridines, such as quinoline and isoquinoline. The strong acids include the mineral acids, the organic sulfonic acids, and the ester acids derived from the polyhydric mineral acids.

In the latter case, the patent states that if the organic radical of the sulfonic or ester acid used is of the type used in the formation of soap from the carboxylic acids, for example, cetyl sulfonic acid, octadecyl sulfuric acid, sulforicinolic or sulfooleic acid, then simultaneously with the formation of the amino-cellulose, a clearing and brightening (avivage) effect is obtained.

Many variations of the process are suggested and it is believed that the reaction may be the addition of one molecule each of pyridine salt, for example the hydrochloride, and aldehyde or ketone, whereby the salt of an α-hydroxylated quaternary ammonium base is formed, which is then further condensed through the hydroxy group, as in etherification, with the cellulose. For example, where R_1 and R_2 represent hydrogen or hydrocarbon radicals, the reaction may be:

of cotton or viscose artificial silk are introduced. This is heated in a closed vessel at 90 to 100° C., for five hours, cooled, the yarn is centrifuged, covered with a little pyridine, the adhering solvent is evaporated or washed out with water, and the material dried. The fiber so obtained has a soft, wool-like feel. The treating liquid can be used for further operations after addition of the quantities of cetyl sulfonic acid and formaldehyde used up." Note the mention of a softening effect, which is probably permanent.

After discussing in some detail the dyeing properties of the above amino-cellulose, the patent states: "Particularly noteworthy moreover is the fact that not only dyestuffs and their intermediate products, but also other compounds with acid properties, such as tannic acids, fatty acids, resin naphthenic acids, sulfonated fats and oils, as well as ester salts of polyvalent mineral acids with higher fatty or naphthenic alcohol, are bound by fiber pretreated according to the invention. In this connection those of the above named classes of substances which have the properties of soaps or soap formers, produce quite outstanding softening and aviving effects.

"The advantage of this avivage over that on ordinary cellulose resides on the one hand in the fact that it is completely stable to washing, since the soaps or soap-like products themselves which are employed for the washing process have an aviving effect on the new yarn."

In another interesting example: "One part by weight or butyl-chlormethyl ether is stirred into ten parts of anhydrous pyridine and, after the evolution of heat is completed, one part of cotton is introduced

$$\frac{R_1}{R_2}C{:}O + \frac{H}{Cl}>NC_5H_5 \longrightarrow \frac{R_1}{R_2}>C<\begin{matrix}OH\\ NC_5H_5\\ |\\ Cl\end{matrix} + HO\text{—Cellulose} \longrightarrow$$

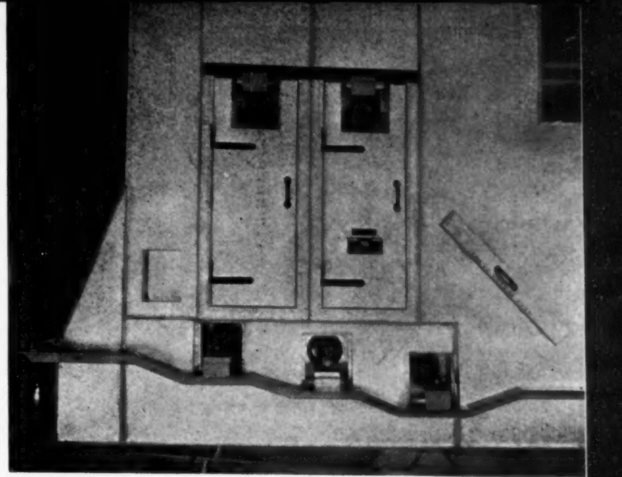
$$\frac{R_1}{R_2}>C<\begin{matrix}O\text{—Cellulose}\\ NC_5H_5\\ |\\ Cl\end{matrix} + H_2O.$$

Numerous examples are given in the patent. The first states that: "One part of paraformaldehyde (trioxymethylene), four parts of pyridine, four parts of pyridine chlor-hydrate, and two parts of cotton are introduced into one hundred parts of chloroform. The mixture is then boiled under reflux for 6 to 8 hours. The cotton is centrifuged or pressed, washed with alcohol and then with water and is then ready for dyeing." Obviously, this is a long and expensive process.

For our purpose, one of the most interesting examples is as follows: "Thirty parts of cetyl sulfonic acid are dissolved in three hundred parts of pyridine and then three parts of gaseous formaldehyde are passed into the solution and thirty parts

and kept in the bath for four hours at water bath temperature, with thorough working. It is then squeezed out or centrifuged, washed out with pyridine or alcohol, the washing agent is removed and the cotton so treated is dyed, whereby, on account of its water-repellent properties it is advisable previously to wet it out in a wetting out bath and also to add a wetting out agent to the dye bath for the purpose of better equalization."

In British Patent No. 426,482, the inventors propose to treat the undyed cellulosic material with quaternary ammonium compounds. Apparently they were interested only in altering or increasing the affinity of the cellulosic fibers for certain dyestuffs, as they do not mention the application of their process to fibers or fabrics that are already dyed. However, it is quite probable that, where the presence of pyridine, etc., does not have a stripping action on the dyed goods, the colors on dyed and quaternary ammonium after-treated materials may be faster to water and washing than on untreated goods.



Small sized curing unit which can be used in Zelan process.

Did They Miss Something?

In the latter two examples, above, it will be noticed that the *permanent softening and water-repellent properties* of the treated material are mentioned, but without any emphasis on these properties, and no mention of, or claim for, these effects are made in the patent claims.

The water-resistant properties of the cellulose esters and ethers of the long-chain aliphatic acids and alcohols have long been known and indicate that certain of these compounds, on or in the textile material, would probably render it permanently water-repellent. The fact that certain long-chain aliphatic acids, their salts, esters and other more or less related compounds have long been used as softeners in textile finishing might lead one to suspect that the presence of similar radicals in a cellulose compound might result in a permanently softer material.

Perhaps many chemists realized the possibilities of such a product but, until the advent of the Zelan process, it was not possible to form these complex organic compounds in textile finishing plants. British Patent No. 426,482 merely offered a new method or reaction whereby it was possible to obtain certain basic cellulose compounds. It remained for R. J. W. Reynolds, E. E. Walker and C. S. Woolvin, of I. C. I., working along lines similar to that of the former British Patent (426,482) to develop the Zelan process, covered by British Patent No. 466,817.

Reynolds, Walker and Woolvin found that on treating textile and other fibers, either cellulosic or protein, with an aqueous solution or suspension of suitable quaternary ammonium compounds, on subsequent heating or baking, the material becomes water-repellent and softer, and

that both of these effects are permanent. In fact, these permanent softening and water-repellent effects, obtainable only on heat-treating the Zelan impregnated fabric, form the entire subject and substance of their patent. This patent is so important that it is quoted in considerable detail.

The I. C. I. Patent

British Patent No. 466,817, states that "we impregnate the said cellulosic materials with a quaternary ammonium salt of the general formula R.O.CH$_2$.NR'R"R"' Hal, which is applied from aqueous solution and we then heat the so-impregnated material to the decomposition temperature of the said salt, preferably after previous drying.

"In the general formula R.O.CH$_2$NR'R"R"'Hal, R stands for an aliphatic hydrocarbon radical of 12 or more carbon atoms which may be normal or branched paraffinoid, or ethylenoid, NR'R"R"' stands for a tertiary amine and the R'R"R"' not necessarily representing monovalent radicals, but two may go together, or all three may go together as in pyridine, and Hal stands for halogen, preferably chlorine or bromine.

"When NR'R"R"' is heterocyclic it is typified by pyridine, but picoline or other pyridine homologue, or quinoline also serve, or an *N*-alkyl-piperidine or *N*-benzyl-piperidine or *C*-homologue thereof; when NR'R"R"' is aliphatic, it is typified by trimethylamine, but triethylamine, tributylamine, triethanolamine or dialkylcyclohexylamine will also serve.

"In carrying the invention into practical effect, the salt R.O.CH$_2$.NR'R"R"'Hal is dissolved in aqueous medium, usually water alone, to give a dilute aqueous solution. If desired, however, other adjuncts, such as wetting agents, or buffering agents, may be added to the bath. The cellulosic material is passed through or dipped in this dilute aqueous bath, the mechanical handling here being suited to the nature of the material. It is then dried and heated as described.

"The production of the desired effects is dependent to some extent on the conditions of drying and heating. Drying is preferably carried out at a relatively low temperature (hereinafter referred to as the drying temperature). The heating is at a higher temperature (conveniently called the baking temperature).

"During heating there is decomposition of the salt, which is made manifest by there being generated an odor of pyridine when the salt is a pyridinium salt.

"The operation of impregnation may be carried out preferably at a temperature below 40° C., especially when dilute aqueous solutions (e.g., 0.1 per cent.) are used; with more concentrated solutions (e.g., 1 per cent) a hotter, even boiling solution may be applied. However, when kept at temperatures above 40° C., the solution may become acid, and a less satisfactory finish, not so resistant to organic solvents, is obtained.

"The drying temperature is preferably low. It is kept low in order that there may be no premature decomposition of the salt. Temperature of drying, however, is a less important factor than speed and other conditions of drying. Thus, for instance, a cotton fabric impregnated with an aqueous solution of octadecyloxymethylpyridinium chloride and dried in more or less stagnant air, as in an oven without artificial circulation, should preferably not be submitted to a drying temperature of more than 30° C., inasmuch as the higher the temperature at this stage the more the intensity of the ultimate water-repellent effect tends to diminish. When, on the other hand, the impregnated material is dried in a brisk current of hot air, so that the water is removed rapidly (in about 3 minutes), then the drying temperature may rise to 80° C. without disadvantage. The dried material is then ready to be subjected to the baking treatment to decompose the quaternary salt, for example, at a temperature of 90° to 120° C.

"Again, if the wet material impregnated in a 1 per cent. aqueous solution is dried on a steam-heated cylinder at 120° C. for e.g., 1 minute, no water-repellent effect is obtained. On continuing the heating for 5 minutes, water-repellent properties are indeed conferred on the material, but the so-treated material is sensitive to the action of solvents.

"The baking treatment is essential for the production of permanent water-repellent properties. The impregnated and dried material begins to show water-repellent properties after baking for 10 minutes at 70° C., but the optimum effects are obtained when baking is carried out at 90 to 95° C. The time of baking necessary to produce the desired finishes varies with the baking temperature and depends also on the nature of the impregnation reagent. The time of baking can be shortened at higher temperatures. For example, using octadecyloxymethylpyridinium chloride, one must bake at 90 to 95° C. for at least 10 minutes, whereas at 115 to 120° C., 3 minutes will serve. The baking time should, of course, be kept at a minimum to avoid damage to the fabric (tendering).

"The following examples illustrate but do not limit the invention. The parts are by weight.

Example 1

"Two parts of the ether of octadecyl alcohol and N-hydroxymethyl pyridinium chloride, conveniently also known as octadecyloxymethylpyridinium chloride, are dissolved with stirring in 98 parts of water at room temperature. Cotton fabric is then padded with this solution, squeezed and dried in warm air (30° C.). The dried material is then baked for half an hour at 90° C., cooled and washed in benzene. A water-repellent fabric of pronounced soft handle is obtained. The finish is resistant both to dry-cleaning and laundering.

Example 2

"Two parts of the quaternary pyridinium halide of the preceding example are dissolved at room temperature in 245 parts of water and a cotton-wool union material padded with this solution. The material is squeezed and dried at 30° C., and then heated at 100° C. for 1 hour. A water-repellent fabric showing a very pronounced soft handle is obtained.

"In the above example other cellulosic material, e.g., viscose artificial silk fibers and fabrics can be used.

Example 3

"Cotton woven fabric, e.g., calico, (1 part) dyed with a 3.6 per cent. shade of Chlorazol Blue BS (Colour Index No. 406) is treated for 20 minutes at 20° C. in 20 parts of a solution containing 1 part of octadecyloxymethylpyridinium chloride per 1000 parts of water. The dyeing is then squeezed and rinsed lightly and dried at a temperature of 40° C. At this stage the dyeing is different in shade from the original, being greener in tone. The dyed material is then baked for 30 minutes at 105° C., the shade unexpectedly returning to that of the original untreated dyeing. This treatment results in an appreciable improvement in the washing fastness of the dye on the dyed material and at the same time imparts to it a very soft handle and makes it waterproof.

Example 4

"Cotton woven material, e.g., calico (1 part) dyed with a 2.0 per cent. shade of Chlorazol Fast Red FS (Colour Index No. 419) is treated as in Example 3. In this case after treatment with the quaternary salt and drying, the dyeing is much yellower in tone, but after baking, the original shade is restored. The washing fastness of the dyeing is much improved and a soft finish and water-repellent properties are imparted to the fabric.

Although the above examples, formulas, etc., mostly mention only cellulose, theoretically Zelan should also give satisfactory results on the protein fibers, silk, wool and leather, as both of these contain replaceable hydrogen atoms connected to nitrogen. In actual practice, the process does not appear to be as successful on the protein fibers as on cellulose, probably because the protein materials are much more sensitive to the high baking temperatures (290 to 310° F. or 143 to 154° C.) necessary than are the cellulosic fibers. However, Slowinske, American Dye Reporter

28, 28, P 647-650 (1939), and others mention its use on silk and H. C. Holland, Jour. Intern. Soc. Leather Trades' Chemists 23, 598-601 (1939), states that Zelan gives a satisfactory softening and water-repellent effect on leather.

In other words, as described by "Analyst," in the *Silk Journal* and *Rayon World* 14, 31 and 36 (1937), the process covered in British Patent No. 466,817, utilizes the same type of compound as is used in British Patent No. 426,482, except that the length of the alkyl radical is increased to at least twelve carbon atoms. Also, the pyridinium compound is first formed and is then applied to the fibers from an aqueous solution or dispersion, instead of in the much more expensive and inconvenient solvent solution. After application, by padding or otherwise, the material is dried and then heated or baked in the air for a short period, instead of a long treatment, sometimes under pressure, in special equipment, etc., as specified in British Patent No. 426,482.

Actual demonstration of evening dress treated with Zelan. Coffee was purposely spilled on dress. After escort wiped off liquid with handkerchief, there wasn't a trace of liquid or stain. Pictures were made by Du Pont Style News.

Chemical Reactions

Although the patent only briefly mentions it, in use the Zelan is applied in the presence of an acid neutralizing agent, such as sodium acetate. In aqueous solution the reaction may be:

$$\begin{array}{l} C_5H_5N—Cl \\ \quad | \\ \;\; CH_2.OC_{18}H_{37} \end{array} + NaO.COCH_3 \longrightarrow \begin{array}{l} C_5H_5N—O.COCH_3 \\ \quad | \\ \;\; CH_2.OC_{18}H_{37} \end{array} + NaCl.$$

Zelan A*.

On drying a cellulosic material impregnated with the above acetate, the reaction may be as follows:

$$\begin{array}{l} C_5H_5N—O.COCH_3 \\ \quad | \\ \;\; CH_2.OC_{18}H_{37} \end{array} + HO—\text{Cellulose} \longrightarrow \begin{array}{l} C_5H_5N—O—\text{Cellulose} \\ \quad | \\ \;\; CH_2.OC_{18}H_{37} \end{array} + HO.COCH_3.$$

When this cellulose compound is baked, pyridine is split off, to give the permanent water-repellent effect, probably according to the following equation:

$$\begin{array}{l} C_5H_5N—O—\text{Cellulose} \\ \quad | \\ \;\; CH_2.OC_{18}H_{37} \end{array} \longrightarrow C_5H_5N + \begin{array}{c} H \\ \dot{C} \\ H \end{array} < \begin{array}{l} O—\text{Cellulose} \\ O.C_{18}H_{37} \end{array}$$

Final, water-repellent cellulose compound.

This final complex cellulose compound may be regarded either as: (1) a mixed formal of two alcohols, that is, cellulose and octadecyl alcohol; (2) cellulose stearyl methylene ether; or (3) stearoxy methyl cellulose.

Zelan is not a chemical theory. It is a light yellowish powder with a pungent pyridine-like odor, somewhat soluble in warm water. It is available in both England and the United States and has now been in use in both countries, and probably others, for quite some time. While the process is not as yet ideal in every respect, in that the Zelan, as might be expected, is expensive and the high baking temperature necessary in actual mill practice requires considerable care to avoid damaging the goods, it is the only "permanent waterproofing" process as yet available. It has recently been stated that properly-treated goods are still water-resistant after ninety launderings.

Briefly, the method of applying Zelan to cellulosic materials is as follows: Concentrations of 0.1 to 0.5 per cent. are used to impart softness only. For water repellent effects, concentrations of 4 to 6 per cent. are used. Slightly less Zelan is suggested for silk and acetate silk. Zelan solutions are prepared for application at 105 to 110° F. (40.6 to 43.3° C.) by pasting the Zelan with commercial ethyl alcohol, diluting with water and adding sodium acetate crystals, previously dissolved in water. A representative formula is:

50 lbs. Zelan A
16 lbs. 11 oz. sodium acetate crystals
10 gals. ethyl alcohol
Water to make a total of 100 gallons.

The above solution is applied, as by immersion padding or impregnating, at 90 to 110° F. (32.2 to 43.3° C.).

Application Directions*

The impregnated material is dried as quickly as possible, preferably at about 110° F. (43.3° C.) but always below 200° F. (93.3° C.), with plenty of fresh air circulation. The dried material is subjected to a heating or baking operation at 290 to 350° F. (143.3 to 176.7° C.) for from one-half to four minutes. Temperatures below about 290° F. are not satisfactory.

The final step is a washing and neutralizing operation which actually increases the water-repellent properties of the goods. It is advisable to use a wetting agent in this mildly alkaline bath, followed by water rinsing, to remove the excess of reagents and decomposition products.

Naturally, the Zelan treatment should be applied to clean, scoured goods, free from starches, gums, oils, soaps, softeners, etc., and should be applied as the final wet process, after dyeing, before finishing. The Zelan-treated goods can be Sanforized, etc., but usually require finishing formulas somewhat different from those used on the untreated goods.

Pro and Con

The main advantages of the Zelan process are its permanency in use, the softness and good draping properties of the treated material, the fact that the pores of the material (fabric, yarn, leather, paper, etc.) are not closed, and the efficiency of the repellent effect, as compared to other waterproofing processes, at high temperatures. Its disadvantages include cost and the high baking temperature necessary to give permanency. It is not suitable for domestic (home) or laundry use, or on completed garments, and can be applied only in plants having equipment under suitable control for the high baking temperature.

* The exact formula for Zelan A (Velan PF) has not been divulged by the manufacturers but it appears to be as given above. However, British Patent No. 506,721, to Tootal Broadhurst Lee Company, states that Velan PF is $C_{18}H_{37}O.CO.NH.CH_2NC_5H_5Cl$.

* The author is indebted to the Du Pont Company for the latest information on the methods of applying Zelan.

NEW Processes and Products

Cyclopon A

Cyclopon is a novel scouring agent, possessing excellent stability to hard water, acids and alkalies. It is offered for all scouring purposes for animal or vegetable fibers. It is particularly recommended for scouring greasy wools, washing of oily wool yarns and wool piece goods, the boil-off of rayon and acetate rayon fabrics, the preparation and scouring of cotton and rayon mixed fabrics. Its stability to lime salts permits its use for removing precipitated lime soaps from fabrics.

New Paint Product

There is now on the market a new product known as Porce-Tite—a white waterproof and fireproof paint which gives a white surface. The manufacturers recommend this unusual paint for use on exterior or interior surfaces such as cement, concrete, face brick, common brick, cement and cinder blocks, stucco, clay tile, cast or natural stone, weathered asbestos siding, coating for asbestos pipe covering, cement floors, for anchoring bolts or brackets in concrete, and all types of plaster-board or fibre building boards.

When mixed to a mortar consistency Porce-Tite can be used for filling cracks or holes in all types of masonry.

Porce-Tite contains no oil, casein or cement, but is a compound of several inorganic materials, chemically treated to produce high water-proofing qualities. It is easily applied with brush or spray, sets in three hours and dries in twelve hours, producing a smooth hard surface which repels grease and dirt. Due to this surface it can be washed with paint cleaners and washing compounds without marring or destroying the finish.

Porce-Tite is a chemical ceramic which bakes itself to the surface and is unaffected by most industrial acids or fumes. As it is composed of inorganic materials, there is no attraction for vermin of any kind. A peculiar feature is that it expands in setting, thus securing a perfect bond to the surface.

Cod Liver Oil Process

A new patented process which should materially increase the domestic production of cod-liver-oil has been made available. This is especially timely now that hope of securing oil from the usual foreign sources is rapidly disappearing.

The process overcomes the basic reason why only about one-third of the oil possible from the livers available in this country has been produced. Because the fishing industry is widespread and because it is not practical to collect and transport livers to central points where volume production could be obtained, production plants could not be set up on a profitable basis. The new process, requiring relatively inexpensive equipment makes smaller scale production at many points where livers are available, a profitable operation.

The process entails the use of a vegetable pulp (sweet potato or beet pulp) dehydrating agent, and then cold pressing the livers to obtain the oil. This has a definite advantage from the standpoint of the quality of the oil in that the danger of destroying the vitamin A content, as in the steam process, is largely eliminated. It also adds another advantage in that the press cake after it is dried has definite feeding values.

New Chrome Dyestuff

A new fast-to light chrome dyestuff, "Pontachrome" Fast Red 2RL, has recently been announced. The new dyestuff can be applied to slubbing, loose wool, yarn and piece-goods by either the afterchrome or chromate method. It possesses very good fastness to light. Light fastness and the intermediate red shade make the dye suitable for shading in the dyeing of upholstery fabrics, men's wear worsteds for suitings and overcoatings.

The new dyestuff fades evenly without change of hue, dyes levelly, exhausts and penetrates well and is readily soluble. It can be applied in open kettles and other types of mechanical apparatus ordinarily used for chrome colors.

Two New Alcohols

Two normal primary alcohols, normal octanol and normal decanol, which have been extensively used in the laboratory, have been made available in commercial quantities. They are good anti-foaming agents, the producer says, and provide a means of introducing octyl and decyl groups for chemical manufacture. They may be used as mixed solvents for the extraction of fats and oils.

Both alcohols have very low solubility in water, but abate foam effectively within the solubility limits, 0.01%-0.05%, according to the company. Normal decanol has a bland odor.

Specifications of the two alcohols are as follows: normal octanol, specific gravity 25/25°C., 0.8225-0.8250; hydroxyl number, 430 plus or minus 15; iodine number less than 1; distillation range, A. S. T. M. method, 90% between 193-196C.; appearance, water white. Normal decanol, specific gravity 25/25° C., 0.8300-0.8380; hydroxyl number, 360 plus or minus 15; iodine number less than 1; distillation range, A. S. T. M. method, 90% between 228-233° C.; appearance, water white.

Rubber Conductors

Specialized compounds of natural rubber and synthetic rubber with a high degree of electrical conductivity have been recently developed by the laboratory research chemists of one of the large rubber companies.

The company also announces that it can now furnish solutions of synthetic rubber which can be applied to the surfaces of natural rubber products like paint, and which will carry away static. This material has already had successful application as belt dressing to carry away static from transmission belts.

Electrically conductive compounds can generally be made softer and more "rubbery" from synthetic rubber, while in the case of natural rubber the compound has to be "loaded" and consequently is stiffer and less yielding.

Natural rubber, unless specially compounded has the highest electrical resistance of any solid material. For conducting static a certain amount of resistance is desirable, since it prevents sparking, and the specialized compounds, both in synthetic and natural rubber allow the amount of resistance needed to remain in the material.

Phi-Φ-Sol

This product is a sulfated ester of a fatty acid. According to the manufacturer it acts as a dye penetrant, color leveler and wetting agent, and possesses exceptional qualities in these applications.

Duraplex ND-77

This is a high alkyd content resin, modified with unique non-drying oils. It is intended primarily for two types of application: as a resin plasticizer with Uformite, and as a resin for use in nitrocellulose lacquers. In these uses it offers definite advantages over Duraplex ND-75. In Uformite baking finishes it possesses better color and color retention, less hazing tendency, improved gloss and gloss retention, and superior water and alkali resistance. It is also somewhat harder than Duraplex ND-75. In nitrocellulose lacquers it demonstrates similar advantages in color, gloss, and hardness, and is more truly non-lifting.

Paraplex RG-4

This resin is similar in general properties to Paraplex RG-2. It represents a further improvement over Paraplex RG-3, which it now replaces in this line. Paraplex RG-4 possesses better initial color and color retention than Paraplex RG-2 and is more compatible with hard resins, such as Amberol 801, and with petroleum solvents. In exterior lacquers it gives improved color and gloss retention.

New Fluorescent Carpet

A new carpet that glows brilliantly in a darkened room when subjected to special ultra-violet rays was introduced by Alexander Smith & Sons Carpet Co., at its exhibit at Pedac, International Building, Rockefeller Center. The new product, made expressly for theaters, has been named Fluorescent carpet.

The company has introduced four patterns in the new carpet and, although all are made in Crestwood carpet quality it is possible to produce fluorescent carpets in any type or weave, since the glowing effect is a property of the dyes rather than of the weave. The carpet's wholesale price is about 20 per cent. more than the regular Crestwood make.

Safety and the National Defense Program

Chemical plants, the country over, are beginning to feel some of the effects of the National Defense Progam: increased production, added shifts, "green hands," and new materials and processes.

Those of us who can recall the experiences of twenty odd years ago will remember that these things tend to make for an increase in accidents, both in frequency and severity, particularly the latter. Accidents, approaching in magnitude at least minor catastrophies, were not uncommon during the hectic days of 1917 and 1918. Undoubtedly some of these will occur in our chemical plants during the next few months unless our safety men are extraordinarily gifted with foresight. It is probably expecting too much to think that safety men in chemical plants ever will be infallible—or will reach the point where they know all there is to be known about chemical hazards—but they certainly can do more than they have done in that general direction. We feel that now is the time for safety men to get out into the plant and find out what is going on where the next big accident may happen. Time spent on accident charts, analyses, bulletins and the like are probably necessary—but time spent out in the plant where the actual work is in progress, finding out what really is happening, will be more valuable in preventing a possible catastrophe than all the paper work you can do. *Chemical Safety*, National Safety Council.

Foreign Literature DIGEST

By

T. E. R. Singer

JOURNAL OF CHEMICAL INDUSTRY XVII, No. 4-5, April-May (1940).

P. 81—V. A. Rozenovich of the Voskresenskii Khimcombinat reports on the utilization of industrial waste products. Up to 1 1/2 years ago only laboratory experiments had been conducted on the utilization of the wastes of this plant. The following were some of the wastes studied: cinder from sulfuric acid industry; weak hydrochloric acid from sodium silicofluoride production; fines from sodium silicofluoride. The cinder obtained from the burning of pyrites is used for the preparation of a magnetic powder called "Trifalin", which is a mixture of iron oxide and a chalk filler. A non-magnetic iron oxide usually results from ordinary burning of pyrites but research work conducted in this plant has led to a special method of burning pyrites in which method the temperature of the lower section of the furnace is maintained at 600-650°, requiring a heavier charge of pyrites. The resulting cinder has a black color and magnetic properties. It is cooled in hermetically sealed drums to prevent oxidation by air. The milled cinder is called "pigment" and has the following composition: Fe_2O_3 - 39.63%, FeO - 19.71%, S - 9.42%, insoluble residue - 21.72% and Al_2O_3 - 2.42%. The magnetic powder is used to separate clover and vetch seed from weed seeds by magnetic separation. Unlike the clover and vetch, weed seeds such as peachwort and dodder have little hairs or grooves on their surfaces which catch the magnetic powder and can thus be lifted out by a magnet. The demand for this powder for such use is about 3000-3500 tons per year. This powder can also be used for other purposes.

The weak hydrochloric acid (4-5% HCL) from the reaction of hydrofluosilicic acid with sodium chloride, is settled out of mechanical mixtures and sold to local industries. A stronger acid could be obtained (up to 10% HCL) by returning the weak acid to be used for dissolving the sodium chloride, but this problem has not yet been satisfactorily worked out.

The second waste product from the sodium silicofluoride industry is a fines consisting basically of tiny crystals of Na_2SiF_6. This material is used in the production of an intermediate industrial product—sodium fluoride, used for the destruction of cockroaches. The sodium fluoride is prepared by boiling the fines with sodium carbonate. The dry product contains up to 80% NaF. The SiO_2 present does not affect the toxicity of the powder.

A new method for obtaining sodium fluoride is now being worked out. This method also yields another product, a dispersed silicic acid called "White soot", greatly in demand by the rubber industry. The sodium silicofluoride sediment is treated with ammonia, yielding sodium and ammonium fluorides and also $Si(OH)_4$. The orthosilicic acid is separated from the fluoride solution and dried. It has the following composition: SiO_2 - 92.5%, R_2O_3 -0.7%, Fe_2O_3 - 0.64%, F - 0.05%, loss during calcination 6.6%. Sodium fluoride is obtained from the filtrate by the action of sodium chloride on the ammonium fluoride. This method will soon be used on a commercial scale.

CHEMICAL SPECIALTIES

Shell Oil Company has recently redesigned its full line of specialty packages to give each item a family resemblance. While modernization and attractiveness were desired, the chief aim of the project was to obtain the utmost merchandising value from the Shell name through quick identification of the individual products with its manufacturer. The redesigning job is discussed in the following pages. Crown Can made the "Shell Tox" can above.

INDUSTRIAL · HOUSEHOLD · AGRICULTURAL

CHEMICAL INDUSTRIES

Frank Randt Photo

How Shell Oil Company has re-packaged its line of chemical specialties in a uniform design.

SHELL SPECIALTIES

Are Now One Big Family

By Charles J. Cunneen, *Assistant Editor*

Shell Oil Company's Specialty Products, Formerly Packaged With Individual Label Designs, Have Recently Undergone a "Face Lifting." All Have Emerged With Uniform Labels Which Quickly Identify Them As Members of the Shell Family.

A MAMMOTH job of package re-designing, encompassing practically the full line of specialties produced by Shell Oil Company, is now in its final stages. The project was undertaken primarily because the fulsome list of petroleum base products heretofore was packaged for marketing as individual units, and not as part of the Shell family of specialties, thus losing a valuable merchandising identification.

The new design follows the familiar red, yellow, and cream color scheme common to the thirty thousand shell stations in the United States.

Basis of the design can be summed up in three cardinal points:

1. Carrying power (visibility and readability).
2. Attractiveness.
3. Elimination of all unnecessary design that cannot be read at a distance of ten feet.

Important also, but subordinate to these three factors was simplification and modernization of the packages. The desirability of these objectives can be appreciated by comparing the old packages with those of the new design in the illustration.

Two packages, Furniture Polish and Glass Kleanzit, which won awards in a packaging competition, could not be blended into the design, and retain their original appearance. However, the lettering on these also ties in with the Shell station motif.

In designing the packages, it was decided to have the label resemble a small poster, eye-compelling and instant registering. To achieve this end, block lettering was used on a totally blank field. This lettering, according to the eminent designer, makes for greater readability at a distance.

Excluding all wording on the face of the package but the product name sells the prospective purchaser at a glance. It is pointed out that sales messages, descriptions, and other related material tend to compete with the name for attention, thus detracting from the prime purpose of the

label. Sales messages, uses, directions, etc., should be inserted on the back of the container.

Similarly, only one distinctive type of lettering was employed on the label. Combined types of lettering, also, have a tendency to vie, each with the other, for attention, which, of course, divides the attention of the prospective purchaser.

The design comprises a broad red base, yellow band and red stripe, with the upper two thirds of the package the same cream color that appears on the service stations. Product identification, only, is printed on the cream background.

In discussing the change, a spokesman for Shell declared:

"The average buyer of furniture polish or insect spray doesn't often associate those products with service stations.

"That's why, when Shell Oil Company, Inc., re-designed their complete line of packages for household specialty items this year, they decided upon a brand new idea in packaging.

"The thirty thousand Shell stations in the United States are painted in a distinctive manner—a broad base of bright red along the ground, topped by a yellow band, with a thin red stripe above the yellow. From the red stripe up to the building roof, the extensions are painted cream color.

"Since this design was accepted and standardized four years ago, the motoring public has grown accustomed to seeing it and associating it with Shell products.

Carry Shell Identity

"Adoption of the standard Shell service station design and color scheme has made it possible to carry Shell identity onto the shelves of retail outlets other than service stations. Few competitive manufacturers of similar household products market as complete a line, and multiplicity of uniform Shell packages helps to re-create the background against which other Shell products are normally sold. In this way, the Shell Specialty items on the retailer's shelves receive the benefit of the good will built up over a period of years by Shell's service station operations, and at the same time serve as reminders of Shell service to motorists.

"In addition, the identity of package design emphasizes the fact that Shell's household Specialties are closely related products, and stimulates companion sales of two or more products, such as insect spray and furniture polish."

When a familiar package is redesigned, it is usually wise to make the change in a series of steps, so that the new label is not too great a departure from the one consumers are accustomed to seeing. If simplification is the aim, part of the background or wording which is to be eliminated will be dropped during the first stage.

After the simpler label has registered with consumers for several months, the final design is released which, in turn, will not be a radical departure from the partially simplified label. Because of the quickly identified Shell colors used as the theme for these new labels, however, such a plan was not necessary.

All bottle packages are made by Owens-Illinois Glass Company. The American Can makes the Shellzone (permanent anti-freeze) and Shell Anti-Freeze cans. Owens-Illinois makes the other packages for mid-western distribution and Crown Can Company handles production in the east. Five-gallon containers are manufactured by three separate companies.

These are the chemical specialties of Shell as they were formerly marketed. Note the lack of kinship between containers.

ADVERTISING PAGES REMOVED

CHEMICAL SPECIALTY *News!*

Six Radio Broadcasts Scheduled At Pest Control Convention—Hollingshead Rebuilding Plans—Nova Appointed—Company News

FEATURING the eighth annual convention of the National Pest Control Association, will be six fifteen-minute broadcasts over three Indianapolis stations. Prof. J. J. Davis, publicity chairman of the Association and T. R. Johnston, director of publicity for Purdue University arranged for the programs on which will be heard both entomologists and pest control operators.

Broadcasts will be heard over station WIBC, Monday, Oct. 26, at 2:15 P. M.; Tuesday and Wednesday at 10:30 A. M. Two programs will be arranged for WIRE between 11:30 A. M., and 1:30 P. M., during the convention, and another broadcast is scheduled over WFSM.

The business sessions of the convention will be chiefly in the form of clinics, with Fumigation and Rats and Mice clinics on Monday afternoon. Tuesday morning's clinic will be on "Termites and Wood Boring Insects."

At the Tuesday luncheon, Arthur N. Overley will discuss "Misleading and Unethical Advertising," while in the afternoon, Public Relations, Sales Promotion, and Advertising will be featured, with George R. Elliott in the chair, assisted by Louis Kotler, Louis Gatto, Harold E. Jennings, and Joseph Lipshie. During this session, a series of "Sales Demonstrations" will be staged, in what is described as "an unique attempt to emphasize the formula of what constitutes a satisfactory service." Different jobs will be attempted to be sold with P.C.O. serving in the capacities of buyers and sellers.

Types of jobs to be "sold" include private homes, apartment house, hospital maintenance, loft or office building, and restaurant. Harold E. Jennings will summarize the points made in the sales demonstrations and criticize faulty techniques. A question and answer session on the demonstrations will follow in which all attendees may participate.

Election of new officers and directors will take place at the Wednesday morning session.

Manufacturers and supply houses having exhibits at the convention will be introduced at a special session Monday evening, and salient features of their displays will be commented upon by William O. Buettner.

The social side of the meeting comes to the fore Monday evening at 10:30 when the reunion is staged. Tuesday evening will be highlighted by the "Pest Control Follies," consisting of a full complement of professional talent. This event is under the supervision of Charles W. Partlow and Lawrence A. McKenna. On Wednesday at 7:30 the annual banquet will be held, with Dr. Edward C. Elliott as toastmaster.

Hollingshead Plans

The R. M. Hollingshead Co., Camden, will not build its new manufacturing plant on the site of the factory which fire destroyed recently, according to R. M. Hollingshead, Sr., founder and president. Tentative construction plans call for a warehouse for storing raw materials at that location, while the manufacturing unit will be located elsewhere in Camden.

Nova Chemical Appointed

Nova Chemical Corp., N. Y. City, has been appointed sole distributor for Nuprint Textile Colors, a new line of colors for textile printing recently developed by Maas & Waldstein Co., Newark, N. J. The colors, it is said, can be applied directly to cotton, rayon, acetate, and other fabrics by means of standard textile printing machinery, with no after-treatment required. After the printed fabric passes over the dry cans, the colors are fixed and the goods finished in the usual manner.

Beaver Made Director

C. S. Beaver has been elected to the board of directors of American-Marietta Co., Chicago, Grover M. Hermann, president, announced recently. He joined American Asphalt Paint Co., in 1929, as manager of its Lincoln, N. J., plant. In 1935, when control of Marietta Paint & Color Co., was acquired, he was made production manager of the new concern. He became general manager of the company's High Point, N. C., division in 1937, and is now general manager for both High Point, and Marietta, dividing his time between the two cities.

Dolan Builds Addition

V. J. Dolan & Co., Inc., Chicago manufacturer of wood finishing supplies, has started construction of an addition to its plant, comprising an experimental laboratory and finishing room, together with two additional private offices.

S. C. Johnson & Son, Inc., is packing its new product, Johnson's Wax-O-Namel in this transparent glass jar furnished by Owens-Illinois Glass Company. It is said to be the first time a paint product has been merchandised in a container which permits consumers to see the actual color.

Personality Parade

At Detroit Meeting of A. C. S.

Above, Thomas Midgley III; Dr. Charles L. Parsons, secretary of the A.C.S., and Mrs. Thomas Midgley III.

At the right, Dr. William Lloyd Evans, Ohio State, and Mrs. H. M. Merker.

Above, G. M. Smyth and Dr. Hans Z. Lecher, both of Calco Division of Cyanamid.

George M. Bramann, Niacet Chemicals Corp.

Dr. E. R. Allen, Krebs Pigments Dept., Du Pont.

Russell M. Jones, The Barrett Co.

Dr. Joseph Ebert, The Farastan Co.

R. C. Newton, Swift & Co. Dr. Newton is chairman of the executive committee of the Chicago A.C.S. Section sponsoring the National Chemical Exposition in Chicago, Dec. 11-15, at the Stevens.

R. B. Semple, Monsanto Chemical.

"Bill" Brophy, R. T. Vanderbilt Co.

Chemical Salesmen At Play

The good old summertime is over for the Salesmen's Association of the American Chemical Industry. These pictures were taken at their last golf tournament held at Pomonok Country Club, Flushing, L. I., on September 17. A record crowd attended.

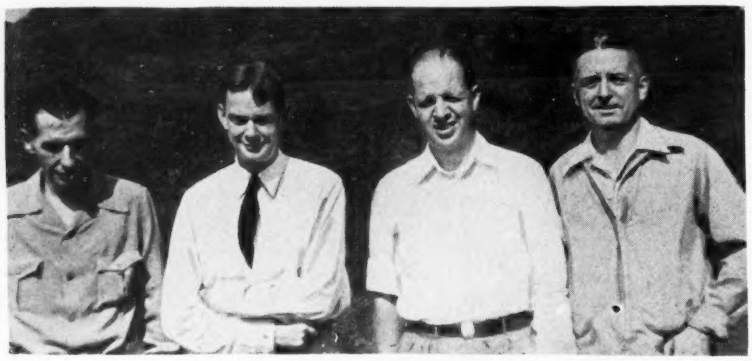
Other Pictures on Page 422

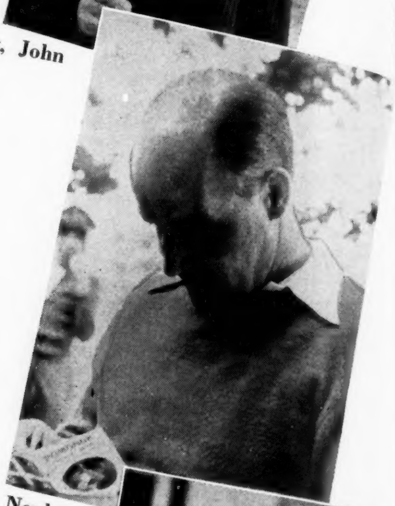
Above, Frank McDonough, New York Quinine & Chemical.

At the left, H. S. Cottrell, Innis-Speiden, taking down the scores; Alfred J. Higgins, Zinsser & Co.; George Bode, R. & H. Chemicals Division of Du Pont; and "Bob" Quinn, Mathieson Alkali.

Above, Ben Riley, John D. Lewis, Inc.

Below, left to right, L. H. Bates and P. Barrett, both of Krebs Pigment; E. W. Farrell, Ansbacher-Siegle; and "Herb" Kranich, Kranich Soap.



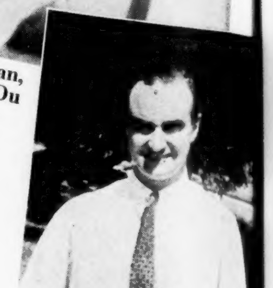


Above, "Fred" Neuberg, Warner Chemical.

"Bill" Atkinson, Charles Pfizer & Co.; R. F. Dufault, R. & H. Chemicals Division, Du Pont; R. G. Von Bermuth and M. N. Denoyelles, both of Pfizer.

Above, "Bart" Sheehan, Grasselli Division of Du Pont.

Below, left to right, Harold Midtskang, Commercial Solvents; R. J. Perry, Zinsser & Co.; Frank J. McHugh, New York Quinine & Chemical; A. F. Yaeger, Grasselli Chemical Division, Du Pont.



"Charlie" Flaccus, Diamond Alkali.

SHARPLES CHLORINE DERIVATIVES

SHARPLES TRADE MARK SOLVENTS

	Mixed AMYL CHLORIDE†	n-AMYL CHLORIDE†	n-BUTYL CHLORIDE†	DICHLORO PENTANES†	POLYCHLORO PENTANES*	2-CHLORO-4,6-DI-tert-AMYL PHENOL*	2-CHLORO-4-t-AMYL PHENOL*
COLOR AND FORM	LIGHT STRAW LIQUID	COLORLESS LIQUID	COLORLESS LIQUID	LIGHT STRAW LIQUID	BROWN LIQUID	LIGHT STRAW LIQUID	COLORLESS LIQUID
MOLECULAR WEIGHT	106.5	106.5	92.5	141.0	Approx. 160	268.7	198.6
SPECIFIC GRAVITY @ 20°	0.88	0.885	0.885	1.075	1.33	1.01	1.11
POUNDS PER GALLON	7.33	7.35	7.35	8.95	11.10	8.41	9.25
DISTILLATION RANGE °C	85-109	105-109	76-79.5	130-200	174-246	160-179 at 22 mm.	253-265
FLASH POINT °F	34	54	20	97	175	250	225
REFRACTIVE INDEX @ 20° C	1.4108	1.4137	1.4026	1.4492	1.4899	1.2158	1.5342
SOLUBILITY IN WATER	INSOLUBLE	INSOLUBLE	INSOLUBLE	INSOLUBLE	INSOLUBLE	INSOLUBLE	INSOLUBLE
SOLUBILITY IN ALCOHOL	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE
SOLUBILITY IN ETHER	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE	SOLUBLE

†COMMERCIAL PRODUCTS *SEMI-COMMERCIAL PRODUCTS

Sharples chlorine derivatives are used as solvents for oils, greases, fats, bituminous materials, tar and printing inks; in organic syntheses for alkylation and as fumigants, insecticides and anthelmintics. Send for Sharples Catalog of Synthetic Organic Chemicals describing more than 125 new compounds.

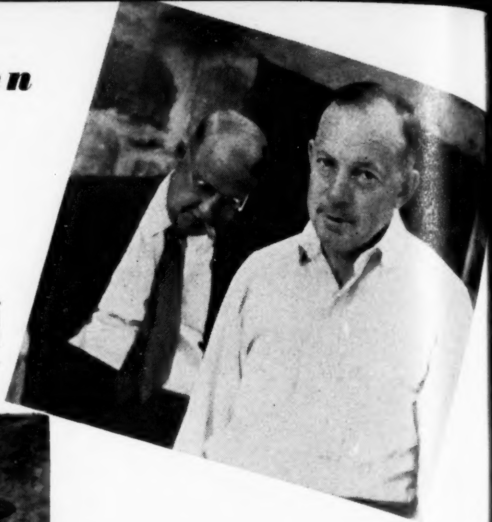
SHARPLES TRADE MARK SOLVENTS

THE SHARPLES SOLVENTS CORP.

PHILADELPHIA CHICAGO NEW YORK

Chemical Salesmen At Play

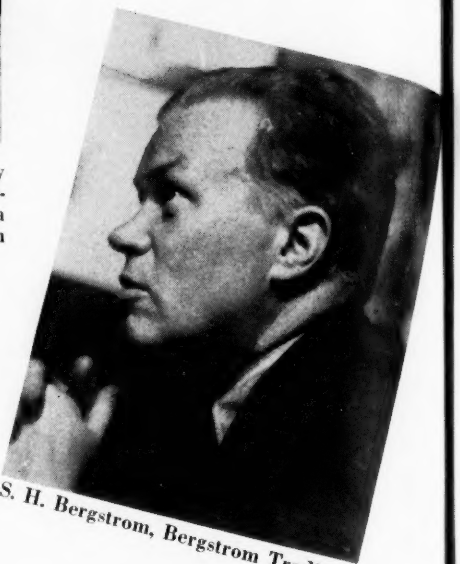
Left, Oscar Lind, Dow Chemical, and Lyman Lloyd, Alex Fergusson Co., Philadelphia.



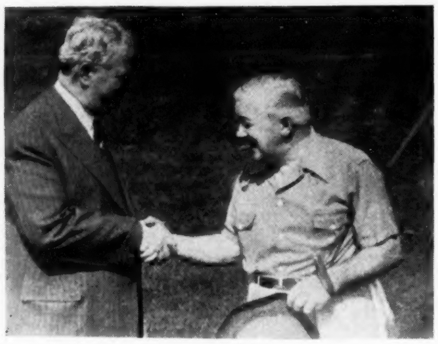
At the right, George Bode, R. & H. Chemical Division of Du Pont, and Paul A. Dunkel, Paul A. Dunkel & Co. Mr. Dunkel won the member's low gross with a 79.

Left to right, John R. Eldridge, Virginia Smelting; Harry Gleichert, Columbia Alkali; "Ed" Manley, Chemical Corporation, Springfield, Mass.; "Jack" Leppart, Columbia Alkali. Mr. Eldridge won low net Class B members with a 70.

"Wallie" Merrill, Joseph Turner & Co., looks over the scores. Wallie is vice-president of the Salesmen's Association.

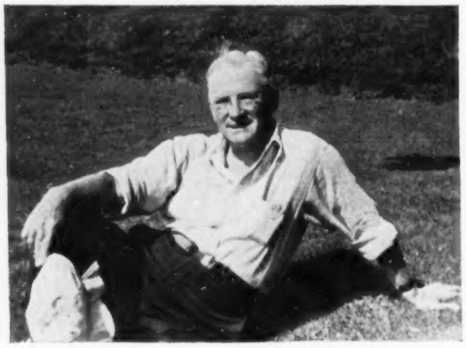


S. H. Bergstrom, Bergstrom Trading.



"Ben" Spencer, chemical broker, congratulates J. T. Brady, eastern representative of Wilson Laboratories.

"Vic" Williams, Monsanto, seems quite pleased with the score he has just turned in.



"Gus" Bayer of Merck in a moment of relaxation.

Left to right, Paul Miller, Lotte Chemical, Denny Peniston, Solvay Sales; Walter Lotte, Lotte Chemical; and "Charlie" Grossman, Solvay Sales.

NEWS OF THE MONTH

GOVERNMENT

Defense Personnel

THE National Resources Planning Board acting jointly with the Civil Service Commission, by request of the president of the United States, is now engaged in preparing a National Roster of scientific and specialized personnel.

In charge of this work is Dr. Leonard Carmichael, president Tufts College, with the title of director of the roster. Assisting him and with the title of executive secretary, is James C. O'Brien of the Civil Service Commission.

In the chemical field both the American Chemical Society and the American Institute of Chemical Engineers are actively cooperating in this work.

Members of these two societies, as well as members of a number of other societies in the scientific and technical world, will shortly receive a questionnaire, to be filled out and returned promptly. Both the American Chemical Society and the American Institute of Chemical Engineers have prepared checklists which will accompany the questionnaires to be forwarded to chemists and chemical engineers throughout the country.

Those who are members of several technical societies may receive more than one checklist, and the director of the roster is particularly anxious to have all chemists and engineers fill out and return promptly all of the checklists they receive, even though it may appear to be a duplication. According to the director of the roster, all questionnaires and checklists will have been mailed out before Dec. 25.

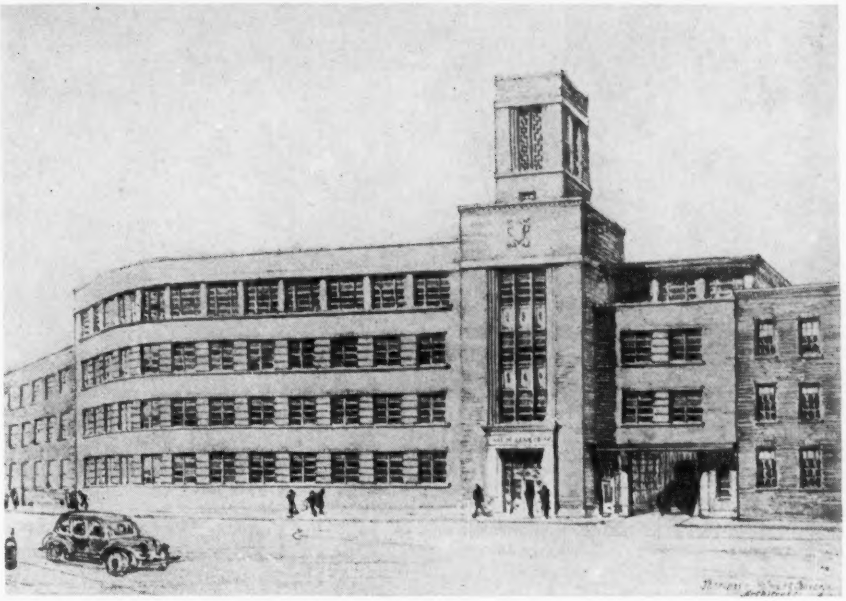
It is expected that all chemists and chemical engineers, whether they are active members or not of any scientific body, will cooperate by filling out and promptly forwarding to the director of the roster, all questionnaires mailed to them.

A. C. S. Defense Plans

Prof. Roger Adams, head of the chemistry department, University of Illinois, has been appointed chairman of an A.C.S. group to correlate and support scientific research on instruments and devices of warfare. The move, according to Thomas Midgley, vice-president of Ethyl Gasoline Corp., and chairman of the A.C.S. Directorate, is designed to co-operate with the National Defense Research Committee.

Other members of Prof. Adams group are: Dr. James B. Conant, president, Harvard; Dr. E. R. Weidlein, director, Mellon Institute; Prof. T. L. Davis, M.I.T.; Dr. Robert E. Wilson, president, Pan-American Petroleum; Dr. Charles L. Parsons, A.C.S. secretary; and Prof. W. K. Lewis, M.I.T.

Dr. Gustavus J. Esselen has been appointed chairman of another group to elect inspectors, "if, as and when the Society might be called upon to assist in the procurement of supplies."



Chas. Pfizer & Co., Inc., is launching a major expansion program, calling for the erection of two buildings estimated to cost between $750,000 and $1,000,000. First building, now under construction, will house packaging, subdividing, finishing, shipping and receiving departments. Second project involves new office and laboratory structure, architect's drawing of which is shown above. Provision has been made for a modern pilot plant.

Naval Stores Probe

American Turpentine Farmers Association, in conjunction with F.B.I. agents are investigating a rumored scandal regarding rosin transactions under 1940 C.C.C. loans. Reports are being whispered that operators bought 1938 C.C.C. rosin, when prices were much cheaper than now, re-distilled and placed it in drums or barrels, then secured 1940 C.C.C. loans on the material at a profit.

Reports in official turpentine circles are regarded as "probably exaggerated."

COURTS

Ellis-Foster Patent

United States Circuit Court of Appeals, in an unanimous decision, upheld a lower court ruling that Gilbert Spruance Co. had infringed upon U. S. Reissue Patent No. 19,967 covering lacquers containing nitrocellulose and a resin made from rosin and maleic anhydride and glycerol, and widely used in wood finishing.

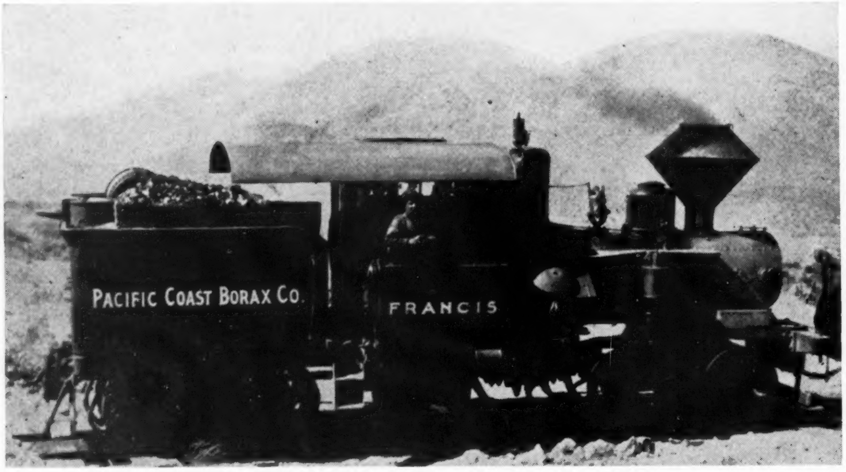
The patent was issued to Harry M. Weber and assigned to Ellis-Foster Company.

In its decision, the court declared: "We think that Weber did demonstrate inventive genius, that he seized upon a thing which was available to all but which had been grasped by none, and was able to fit it into a new place, to create an original and useful result. We conclude that this was not the exercise of mere mechanical ingenuity or a step in the natural development of an art, but was, in fact, invention. The case at bar presents an almost classic example of a new use."

LEWIS H. MARKS

Mr. Marks was recently elected executive vice-president of Publicker Commercial Alcohol Company, Philadelphia, Penna.

Iron Horse Replaces 20 Mule Teams



Pacific Coast Borax Co., is celebrating its 50th business anniversary this month. Though the colorful twenty mule teams which carried the first Borax ore out of Death Valley have been replaced by modern railroads, they are inextricably associated in the public imagination with pioneer days in our country, F. M. Jenifer, president, points out. A comprehensive article tracing the history of the Borax industry is included in the feature section of this issue.

ASSOCIATIONS

Chemical Exposition

During the National Chemical Exposition sponsored by the Chicago Section, A.C.S. at which CHEMICAL INDUSTRIES will again feature its popular "New Chemicals for Industry" exhibit, a program has been arranged bringing a noted group of speakers to the rostrum discussing chemistry and its application in many industries.

The Exposition will open December 11 and run through Dec. 15, at Hotel Stevens, Chicago.

Technical sessions for this conference have been arranged for Thursday afternoon and evening, December 12; Friday forenoon, December 13, and Saturday afternoon, December 14. The regular monthly meeting of the Chicago Section of the American Chemical Society will be held on Friday evening, December 13.

The program follows:

THURSDAY FORENOON, DECEMBER 12

Presiding: Bruce K. Brown, general manager of research and development, Standard Oil, Chicago.

"New Developments in Synthetic Chemicals and Materials for Fuels and Lubricants," Walter G. Whitman, head, department of chemical engineering, M. I. T.

"New Developments in Synthetic Chemicals and Materials in the Rubber Industry," E. V. Murphree, vice president in charge of research and development, Standard Oil Development Company, N. Y.

THURSDAY EVENING, DECEMBER 12

Presiding: Harrison E. Howe, Editor, I. and E. C.

"Service of Chemistry to Human Nutrition," C. A. Elvehjem, professor of agricultural chemistry, U. of Wisconsin.

"Service of Chemistry to Agriculture," H. G. Knight, chief bureau of agricultural and engineering chemistry, Department of Agriculture.

FRIDAY FORENOON, DECEMBER 13

Presiding: C. D. Hurd, professor of organic chemistry, Northwestern.

"The Influence of Electrolytic Processes on the Development of the Chemical Industries," C. G. Fink, head, division of electrochemistry, Columbia.

"The Influence of New Solvents on the Development of the Chemical Industries," C. L. Gabriel, vice-president, Commercial Solvents.

"The Influence of the Friedel-Crafts Reaction on the Development of the Chemical Industries," E. C. Britton, director of organic research, Dow

FRIDAY EVENING, DECEMBER 13

Presiding: William F. Henderson, chief chemist, Visking Corp.

Illustrated lecture on "Color photography," Regular meeting of the Chicago Section, A.C.S. This is the Chicago Section's annual Ladies' Night.

SATURDAY AFTERNOON, DECEMBER 14

Presiding: Allen Abrams, technical director, Marathon Paper Mills.

"Effect of New Resistant Materials on Modern Industrial Chemical Development," James A. Lee, managing editor, Chem. and Met.

"Effects of Economic Conservation of By-Products on Modern Industrial Chemical Development," L. W. Bass, assistant director, Mellon Institute.

"Effect of Instruments for the Chemical Industries on Modern Industrial Chemical Development," John J. Grebe, director of physical laboratory, Dow.

Additions to the list of speakers will be announced later, according to Victor Conquest, chairman of the exposition program.

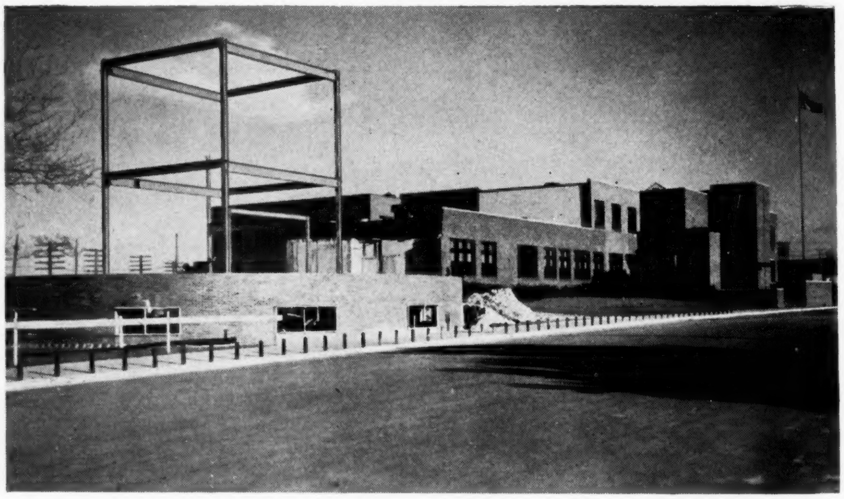
A.I.Ch.E. Meeting

The American Institute of Chemical Engineers will hold its 33rd annual meeting in New Orleans, December 2-4, with headquarters at St. Charles Hotel.

Tentative arrangements have been made to provide a special train which will leave New York, Saturday, November 30, Pennsylvania Station at 5:10 p.m. and arrive in New Orleans on Monday, December 2, at 7:55 a.m.

The special train will be routed via Cincinnati, Louisville and Nashville. Complete details are now available from the executive secretary's office, 50 East 41st Street and reservations should be made promptly.

Most of the details for the program at New Orleans have been completed. Technical sessions will be held during the mornings of the 2nd, 3rd and 4th. Plant trips have been scheduled for the Grande Ecaille plant of Freeport Sulphur, the



Dow Chemical Co. is spending $150,000 on this addition to its headquarters in Midland, Mich. When completed, it will be occupied by the auditing and the rapidly expanding sales department. This represents the second change in the Dow office building since 1936.

sweet potato starch plant at Laurel, Miss., the Naval Stores plant of the Hercules Powder, Hattiesburg, Miss., and the Bogalusa Paper Co., Bogalusa. There will be a students' meeting at New Orleans on the 5th and 6th of December.

Textile Chemists Meet

Twentieth annual meeting and convention of the American Association of Textile Chemists and Colorists will be held Oct. 18-19 at Hotel Commodore, N. Y. City, and on Oct. 20 at World's Fair.

T. K. Almroth, advertising manager (left), Jerome Curran, Beverage Division, and F. J. Solon, vice-president and general sales manager of glass container division, Owens-Illinois Glass Co., examining a group of "Duraglas" bottles.

(Story in General News.)

PERSONNEL

HILLARY Robinette, former president, W. H. & F. Jordan Mfg. Co., has joined Commercial Solvents Corp., to promote latter's recently introduced textile specialties . . . **F. M. McNerney** has been named technical director of Detroit, Chicago and Dallas plants, The Armstrong Co. . . . **Charles L. Drum** has been named western sales manager of Owens-Illinois Glass.

F. M. McNERNEY

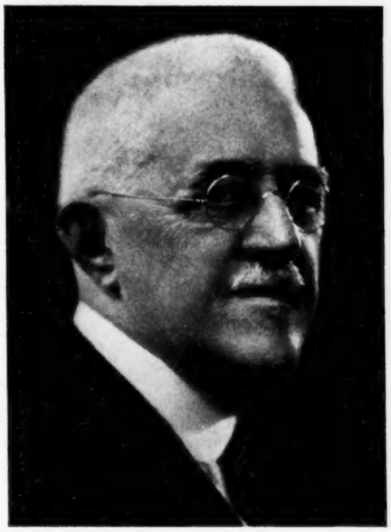
W. Richison Schofield, former chief engineer, Leeds & Northrup Co., has been appointed director of engineering; **John W. Harsch** has been promoted to chief engineer, with **John F. Quereau** as assistant . . . **Dr. A. Ernest MacGee,** manager, Skelly Oil solvents division, has been transferred from Chicago to general marketing office at Kansas City, Mo., where he will also handle butane sales . . . **John H. Calbeck** has been named research director, pigment division, American Zinc Sales Co., succeeding Harlan A. Depew.

Dr. G. L. Cunningham has joined the technical service department, Columbia Alkali; **A. E. Daly** joins the sales staff handling l.c.l. sales in Chicago metropolitan area . . . **Prof. Chester M. Alter,** Boston U., has been appointed chemical consultant of Vultex Chemical Co. . . . **Robert E. Brannan** has been named manager, molding material sales, Bakelite.

Walter Pfluger has been appointed New York district manager, Rumford Chemical Works; other appointments follow: **E. R. Baumert,** Dallas district sales manager; **Marvin Johnson,** Chicago district manager. **J. Robert Fischer** has been appointed manager, special products, Millmaster Chemical Co. . . . Electro Metallurgical Sales Corp., announces following promotions: **S. C. DuTot,** division manager for Birmingham, Pittsburgh, Cleveland and Detroit areas; **W. E. Remmers,** Chicago division manager; R. E. Brown, Pacific Coast division manager.

OBITUARIES

OSCAR L. BIEBINGER, 80, president of Mallinckrodt Chemical Works, died last month at his St. Louis home, after returning from his summer home in Osterville, Mass., where he had been ill for several weeks.



OSCAR L. BIEBINGER

Mr. Biebinger joined the Mallinckrodt organization in 1888, and was elected secretary and director in 1893. He was elected president of Mallinckrodt in 1925, but for two years past had not been actively directing the company.

William M. Kerr, 82, executive of Allied Chemical and Dye Corp., died in Philadelphia after a brief illness.

Edward C. Worden, 65, consultant head of Worden Laboratory and Library, Millburn, N. J., died in his sleep recently . . . Thomas Neal, 82, famed industrialist and one of the founders of Acme White Lead and Color Works, died in Detroit.

GENERAL

Murphy To Talk

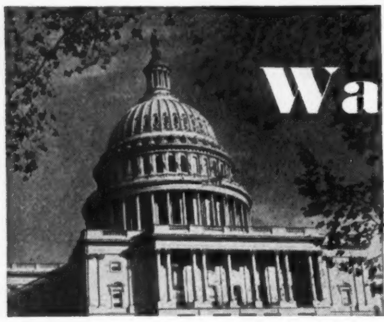
Walter J. Murphy, Editor of CHEMICAL INDUSTRIES, will discuss "The Role of the Professional Engineer In Defense" before the Pratt Institute Chapter, A. I. Ch. E., on Oct. 17.

"Duraglas" Introduced

A new technique in glass making, called Duraglas, resulting in a stronger and more durable container, is announced by Owens-Illinois. "Duraglas," according to officials of the company, has been placed in production at several of the glass plants under its operation.

Crown Blaze Exaggerated

Reports of a fire which occurred at Baltimore plant of Crown Cork & Seal were greatly exaggerated, company declares. While large surplus stocks of cork were destroyed, the fire did not reach other reserve stocks, nor did it threaten any manufacturing buildings.



Washington

Russell Kent

THE defense problem continues to occupy the stage in Washington to the exclusion of practically all other activities. And with the increasingly grave international situation, the prospects are that this condition will prove to be the case for some time to come.

There is no clarification of some of the confusion which has marked the defense program from the outset. As a matter of fact, in some directions, the confusion has increased. For example, there has been no decision regarding the method to be used in the production of ammonia at the several government plants which are to be constructed for that purpose. Where the bulk of the blame lies for this situation is not clear. The fact, however, speaks for itself.

Russell Kent

There has been delay in the defense program attributable to lack of legal agreements as to amortization of new plants constructed especially for defense orders, a matter cleared up by the new tax bill. But there has been further delay in the important direction of political pressure having been exerted regarding the location of these new plants.

So serious did this pulling and hauling in an effort to get economic advantage from the location of plants become, that the entire situation was referred to President Roosevelt in person for a decision.

Under the law, the National Defense Advisory Commission is given a veto power over location for government plants, as all sites must be approved by the Commission. The Reconstruction Finance Corporation is cooperating closely with the Commission regarding location of plants constructed by private industries through RFC loans. The Commission has been adamant that no considerations should be taken into account as to locations except those based soundly upon economic and strategic data.

It is to be noted that although ample funds have been provided by Congress for government plants to fill the gaps in industry in connection with chemicals and ordnance, up to October 1 there have been located only three such plants—two powder plants and one for TNT.

It is understood also that in addition to the pressure of political influences in an effort to sway the judgment of officials as to locations, there also has entered at one or more points the element of organized labor opposition to plants going into specific localities where in the past there has been antagonism to organized labor or certain parts of it. For example, the report that a shell loading plant was to be located at Gadsden, Ala., brought an immediate protest from the CIO against such a decision because of bitter and losing fights which the CIO had conducted in Gadsden in connection with two other plants in that locality.

So far as concerns a tired and confused Congress, every facility has been provided for the advance of the defense program. Appropriations have been voted almost exactly as requested by the President. Total appropriations for the Army and Navy put on the statute books since June 1 aggregate $8,334,000,000 in cash and $3,802,000,000 in contractual authority, for a grand total of $12,136,000,000. This excludes approximately $500,000,000 for civil activities connected with the defense program.

Numerous Contracts Awarded

Under this very broad authority to expend money, numerous contracts have been awarded and some of them will commit the government to expenditures far beyond the sums named in the immediate contract. For example, the bill authorizing a "Two-Ocean" Navy contemplates expenditures of $4,000,000,000 but the actual sum involved in the present fiscal year and reflected in the figures given for defense appropriations is only $186,000,000. The remainder must be appropriated at future sessions of Congress if the program is to be executed.

This Congress has provided not only for conscription of manpower but also for conscription of industry should that become necessary. After considerable jockeying as to the exact form of the authority to be granted regarding compulsion upon industry to participate in the defense program, Congress in the conscription bill adopted a section which is practically identical with the one written into the 1916 national defense act but which, at that time, applied only when the country actually was engaged in war. This section substitutes for a provision written hurriedly into the Navy speed-up bill in June which would have provided for the requisition of private plants considered essential to the defense whose owners were recalcitrant. In brief, it provides that private plants considered to be essential to the defense and whose owners fail to agree to accept contracts from the government, may be taken over and operated by the government itself on a rental basis. The section also provides for priority of government orders on the part of those who accept them. There is a criminal penalty provision of a maximum fine of $50,000 or confinement for a maximum of five years.

Those businessmen who find themselves confused over the intricacies of the new tax bill, the second to be enacted in 1940, may console themselves, if that be possible, by the knowledge that very few members of Congress themselves understand the complications of this measure.

It should be understood further that another tax bill is to come forth next year. It will apply to incomes earned in the calendar year 1941. The bill with which Congress has just been struggling applies to incomes earned in 1940.

Tax Revision Due

As to the 1941 tax revision, there appears no doubt. The Treasury has informed members of Congress privately that its experts will begin studies of tax revision at the first of the year and that the bill will be proposed after the March income tax returns have been filed and analyzed. The Treasury's forecasts, of course, are dependent upon continuation of the Democratic Administration. But should the Republicans win the November elections, it is equally certain that there will be a tax bill next year, for Republican members of Congress are thoroughly dissatisfied with the two measures put on the statute books this year.

In the final analysis, the so-called excess profits bill resolved itself into a hodge-podge revenue bill and with the excess profits features given little study. The measure, however, does take care of the important question of amortization of plants constructed for defense production and, furthermore, it wipes out restrictive features of other laws as to profits earned. In this last connection, the bill repeals the profit limitations on Army airplanes and Naval vessels contained in the Vinson-Trammell act of 1934 as revised downward last June. And it repeals also the 10 per cent. profit limitation on merchant ship construction contained in the 1936 Merchant Marine Act. In other words, Congress took the view that inasmuch as excess profits were to be taxed without regard to the commodity which

(Cont'd from page 428)

produced these profits, there should be one law applied to all commodities.

There has been no relaxation of the labor laws and none appears probable. Wage increases have been sharp in some localities and regarding some classes of workers. In connection with the construction of cantonments for troops, the Labor Department fixed wages of building craftsmen considerably in advance of the going rate in the locality on the ground that it was necessary to compensate workers imported from distant points for the dislocation of their living arrangements which doubtless resulted in higher costs of living to them. At Camp Dix, New Jersey, the wages of carpenters on the cantonment there were raised by the Labor Board sixty to seventy per cent. above prevailing wage in that vicinity.

To Train Workers

Meanwhile, the Administration has provided approximately $125,000,000 for training workers for defense projects through the Office of Education, the National Youth Administration and the Work Projects Administration. Of this total, $108,000,000 was provided by direct appropriation of Congress and the balance came from allocations of the NYA and WPA from their regular appropriations.

Great efforts are being exerted to implement the good will policy towards Latin America and bring about the continental solidarity so much desired by the United States. The Export-Import Bank has been provided with $500,000,000 additional capital, making its total $700,000,000, and practically all of this money will be lent to Republics to the South.

In this connection, studies are being conducted of purchases which may be made from Latin American countries to bolster the defenses of the United States and help the economy of these nations. One of the deals involves the acquisition of nitrate from Chile and its storage in this country. From the defense angle, Chilean nitrate is no longer necessary to the United States, owing to the heavy production of the synthetic variety for use in explosives. It is understood in fact that there is a considerable quantity of Chilean nitrate still held in storage by the Army which was left over from purchases made in World War days.

Jones Succeeds Hopkins

Jesse Jones has been made Secretary of Commerce to succeed the ailing Harry L. Hopkins who resigned his cabinet position. But despite the cordial dislike that a number of extreme New Dealers hold for Mr. Jones, because he had on numerous occasions refused to pervert the purposes of the RFC to political and social ends, Jones will remain as administrator of the Federal Loan Agency.

HEAVY CHEMICALS

Industrial Upturn Accelerates Buying

Defense Program Indirectly Accounts For Small Part of Better Business—Oxalic Acid, Bichromates In Slightly Better Supply—Saltcake Being Shipped From Production—Exports Off

PRODUCERS of heavy chemicals are looking forward to a steadily accelerating demand for the next few months, and expect the year to close with a rush when defense buying becomes serious. While part of the expanded volume during September can be traced to industries participating in the early stages of defense production, our files show that this department called the turn on a fall upswing as far back as last May.

This industry will unquestionably benefit from defense orders, and these reports shall credit the "Great Golden Father" with his full contribution to improved business, but they shall never give three cheers for the WPA every time the curve jumps a notch.

Silicofluoride Bolstered

Some easing was noticed in oxalic acid and bichromates during the period under review. Neither can be bought at random in the open market, but regular consumers are receiving prompt shipments which represents an improvement.

Silicofluoride has been bolstered due to lack of imports, and synthetic saltcake, for the same reason, is being shipped from production. Alkalies continued in fine demand from glass industry and prospects are pleasant for the balance of the year.

Copper sulfate followed the metal market into higher ground. Crystals went up 15c and monohydrate 20c a pound. There was little covering activity before the rise. Buyers are not impulsive with regard to metals. They are inclined to "wait out" the fluctuations that have featured the primary market of late.

Drop In Exports

Exports dropped off a bit during September. Domestic manufacturers found severe competition from Japan in South American markets on agricultural insecticides and fungicides. This situation was commented upon in our last report, but seems to have become aggravated during the intervening weeks. However, the bulk of the business in these items has been shipped for the countries where Spring planting is now going on.

The Far East which had been accounting for a fair percentage of total exports felt the pressure of unrest created by Japan's new attitude. This is most apparent in regard to the Dutch East Indies, which a month ago had been ordering good quantities on a forward basis.

Important Price Changes

ADVANCED

	Aug. 31	Sept. 30
Antimony, needle, powd.	$ .18	$ .20
Copper Carbonate	.1570	.1650
Metal	.11	.12
Sulfate, 100 lbs.	4.45	4.75
Lead Metal	.49½	.50
Manganese Sulfate	.09	.09½
Tin crystals	.38	.39
Metal, N. Y.	.50½	.51¾

DECLINED

None

But with the strong revival in domestic business, this slackening in exports may be welcomed in some quarters, there being just so much production for all customers.

Sodium Chlorite Plant

Mathieson Alkali Works, Inc., is building a $400,000 plant at Niagara Falls, N. Y., to produce sodium chlorite, newly developed chemical that promises to have wide use in the wood pulp, textile, and other industries. Sodium chlorite, though long known as a laboratory chemical, was discovered by Mathieson's research organization to have special properties that make it valuable for use in many important industrial processes, particularly as a bleach for paper and textiles.

General Chemical Builds

General Chemical Co., subsidiary of Allied Chemical & Dye Corp., will shortly start construction of a plant in River Rouge, Mich. A sulfuric acid unit will be erected first due to the demand for this product in the Detroit area.

Selling Agreement to End

The selling agency of Joseph Turner & Co. for Oldbury Electro-Chemical Co. products will be terminated by mutual agreement of both parties with the close of the calendar year 1940.

Illinois Tech. Formed

Illinois Institute of Technology has been formed through the merger of Armour Institute of Technology and Lewis Institute. Henry T. Heald, 35 years old, for two years president of Armour Institute of Technology, was elected President of the new institution.

FINE CHEMICALS

Army Is Placing Large Quinine Orders

Navy Continues To Buy Mercury Oxide—Easing Of Metal Not Expected To Affect Mercurials—Caffeine, Theobromine Tightness Continues—Seasonal Items Lag—New Argols Source Seen

BUSINESS in fine chemicals was at a nice level during the past month. There can be no doubt now that these items will feel an exceptional call from the government when defense program gets into full stride. Already quinine is being taken in very large quantities by the Army. Mercury oxide continues to find real volume in Navy Department orders.

While the Army has always been in the quinine market in a small way, demands developing during the past month show signs of a major expansion. It is understood that the orders call for hundreds of thousands of ounces, which is quinine buying on an unprecedented scale as far as Uncle Sam is concerned.

This demand was not wholly unexpected, however, as chinchona bark is one of the items defense commission experts were anxious about as long as three months ago. Stocks in this country are now considered adequate to care for both commercial and Army needs. It wouldn't occasion any great surprise in this corner, though, if the quinine price took another fractional jump in the not distant future.

The mercury oxide demand ties in with naval construction and re-commissioning program. It goes into anti-fouling paint. First orders, forecast here for some time, appeared and were commented upon last month.

Mercury Continues Easy

Primary market for mercurials continues to show an easy tendency at its present levels. Domestic production has now caught up with requirements. This will have practically no effect on the price of derivatives. No drop can be looked for in this direction. In this connection, it must be remembered that talk of easiness in quicksilver means nothing while the price per flask is just about double the normal market. Another consideration is that manufacturers are working with material bought at the peak market. However, it is doubted in informed quarters that there could be any reduction in derivative prices even though manufacturers took material at current prices which, in many cases, are all of $20 per flask lower.

There has been no change in caffeine or theobromine. Those holding contracts are getting their rationed supply, but nothing else is available to be sold.

Seasonals used in the manufacture of

Important Price Changes

ADVANCED
None

DECLINED

	Aug. 31	Sept. 30
Acid, hydrobromic	$ .42	$ .35
Camphor	83	.82
Iodine, Resublimed	2.25	2.15
Mercury Metal, Flask	183.00	173.00
Methanol, gal.	.29	.28

winter pharmaceuticals will start moving shortly. It was thought in some quarters that signs of this business would develop during the period under review. Very little has been uncovered in a market check.

A possible new South American source of supply for argols was checking manufacturers with the past ten days. Samples are available for analysis from wineries in two countries interested in building up exchange in the U. S. for purchase of materials and commodities formerly supplied by Europe.

South America continues the chief export buyer of fine chemicals with demand moving evenly. All factors are shipping and finding it a nice addition to domestic volume.

Skytop Meeting Plans

Reservations are pouring in for the annual fall meeting and golf tournament of the Drug, Chemical, and Allied Trades Section, N. Y. Board of Trade, John C. Ostrum, secretary, reports.

Meeting will be held Oct. 18-19 at Skytop Lodge, Skytop, Pa. A special Lackawanna R. R. train will leave Hoboken, N. J., Oct. 17. An informal cocktail party will be held that evening.

Dow Security Broadened

Security afforded nearly 4,000 employes of Dow Chemical Co., under terms of a group program adopted in April, 1934, has been increased by the addition of hospital and surgical operation benefits, according to Dr. Willard H. Dow, president.

COAL TAR CHEMICALS

Market Shares In General Pick-Up

Better Call For Benzol Cheers Producers—Toluol Demand At High Level, Though Supplies Remain Adequate—Xylol Somewhat Better—Intermediates Buying Quickens—Exports Dead

DEMAND for coal tar derivatives shared the upturn which has lifted volume in other chemicals during September. Most encouraging to producers was bettering of benzol. This material is in no great position, but regular consumers called for larger shipments from regular suppliers.

There still are large quantities of benzol in second hands. Due to renewed demand, however, this is no longer making the market, although some is finding its way into regular consuming channels at a price.

Toluol Shipments Steady

Toluol is enjoying good demand. Shipments are steady, with lacquer trade accounting for a good percentage of the total volume. Supply is adequate. There are no alarming quantities in producer inventories, but material is available for all domestic needs. Best opinion is that toluol will show a nice balance between production and consumption until the oil companies begin production. Then it is expected, there will be enough toluol around to float a battleship.

This picture is no longer serious, however. As pointed out in this column last month, the government stands ready to take any pressing quantities off the market.

Important Price Changes

ADVANCED Aug. 31 Sept. 30
None

DECLINED
None

Xylol continues fair, with the price unchanged. There was a slight increase in demand but business has not reached a point where it can be classed as good. Phenol moved well.

Intermediates felt a spurt over sluggish business that featured the market this summer. Buying has broadened, offering favorable indications for the coming months.

Exports mean nothing these days. There is some activity in Canada, and prospects for future purchasing of toluol essential to the production of munitions. Some inquiries have already come into the market, but it is doubted that projected plants are ready for production just yet.

SOLVENTS

Sharp Improvement Features Market

Reserves of Some Producers Entirely Cleaned Out—Spot Buyers In "Dangerous" Position—Solvent Prices Expected To Remain Steady With Increase On January 1—Exports Poor

SOLVENTS market activity during the past six weeks has practically cleaned reserves of most producers. Shipments, in some cases, are going forward from production. Spot buyers were described as in a dangerous position where sizable quantities are needed.

The expansion in solvent buying is not a spurt in any single trade. Orders have given indications of a broadened market, and buying is expected to hold its gains for several months to come.

Pricewise, no revisions are expected until the end of this year. Some firming is looked for at that time. It is also likely that material will tighten, with prospects of delays on delivery during the next few months.

Paint Trade Active

Paint and varnish industry retained the momentum built up since Labor Day, while automotive buying of solvents for car finishes went on apace. Alcohols continued to move along with the trend, and production was expanded in some quarters so good do producers feel about the future.

Acetone demand increased, and plans for expanded production are being carried out by at least one factor. There is some distressed material on the market, but regular consumers are not "biting" at offers.

Exports are confined to Canada and Great Britain for the most part, although business developed with one Latin American neighbor after a credit of $20,000,000 was granted to the government. Previous to the loan, a decree restricting trade with the United States had been promulgated. This was in force three weeks prior to the scheduled visit of one of our "good-will ambassadors" who arranged the credit which resulted in the lifting of the import restrictions.

Far East business being booked is subject to cancellation in the event of a total embargo which is within the realm of possibilities.

Important Price Changes

	Aug. 31	Sept. 30
ADVANCED		
None		
DECLINED		
Alcohol, diacetone	$0.12	$0.09½

Salesmens Golf Finale

Salesmen's Association of the American Chemical Industry closed its golf season Sept. 17, at Pomonok Country Club, Flushing, L. I., with a record turnout for the day of sport and evening of entertainment. Paul A. Dunkel was crowned champion of the day after turning in a low gross score of 79.

Winners were: Members, class A, 1st low net, F. W. Green; members, 1st low net, Class B, J. R. Eldridge; 1st members kickers, W. F. George; members, 2nd low net, Class A, I. Vanderwater; members, 2nd low net, Class B, R. L. Hutchins, 2nd members kickers, J. J. Alvarez.

First guest low net, W. Berry. 1st guest kickers, S. P. Craven; 3rd members kickers, C. F. Alexander; 4th members kickers, B. F. Sheehan; 2nd guest kickers, H. P. Weirman.

Nearest pin on 17th hole, J. J. Cudahy; longest drive on 12th hole, H. H. Finn; least putts, members and guests, H. Kranich.

Door prizes were won by Frank McHugh, George Bode, A. L. Weiner, and A. J. Higgins, while R. G. VanBermuth won a prize for handing in a card totaling 141, highest score of the day.

Marshall Addresses Teachers

A. E. Marshall, president, Rumford Chemical Works, discussed "The Value of Chemical Training To Citizens" before the New England Association of Chemical Teachers at its 203rd meeting, held Oct. 5, at Lincoln School, Providence, R. I.

Egloff Gets Medal

The Western Society of Engineers will present the Chanute Medal, awarded annually for the best paper on mechanical engineering, to Dr. Gustav Egloff. Dr. Egloff's paper dealt with motor fuels of the present and future.

Hydrocarbon Trade Name

Synthetic rubber products of the newly organized Hydrocarbon and Chemical Rubber Company, Akron, will be sold under the general trade name "Hycar," announces Ross W. Thomas, president. Bulletins and technical data as well as samples of the products will be issued shortly.

PIGMENTS AND FILLERS

Defense Program Aids Paint Trade

Last Quarter Expected To Be Year's Best—Army Building Seen As Volume Booster—Zinc Oxides Price Raised For First Time Since 1937—Titanium Pigments Pick Up—Carbon Black Good

PAINT manufacturers reacting to the first stimulus of defense program needs, pushed the pigments market forward at a greatly accelerated pace during the past month. Authoritative quarters look for a big final quarter, with momentum carrying the peak defense demand well into next year.

Such orders as are coming through now, it is pointed out, represent only preliminary operations. Housing for the drafted conscription, plus the expanded regular forces will require tons of paint, not to speak of coatings required by myriad items of equipment necessary to the maintenance of an army.

Price of zinc oxides rose fractionally while buying was at its peak. This was the first price rise on these items since July, 1937, but buyers paid no heed to the development and business boomed merrily along. Lead oxides also firmed up toward month's end following a rise in the primary market, without having any effect on the swelling volume. Dry colors shared the general improvement in the market.

Important Price Changes

ADVANCED	Aug. 31	Sept. 30
Lead, red	$0.0815	$0.0825
Zinc, dust	.08½	.09¼
Oxide	.06¼	.06½
DECLINED		
None		

Titanium pigments resumed their good pace. This material had lagged slightly during summer months, after being a leader in point of volume during the Spring.

Renewed automotive activity brought about a nice demand for carbon black. Most of the orders originated in Akron, to be used in tire manufacture.

Casein is reversing the trend of the market despite limited production. There has been no official price change; it is doubted that material will hold its present level unless some buying activity makes its presence felt shortly.

 Prepared Monthly by U. S. Industrial Chemicals, Inc.

U.S.I. CHEMICAL NEWS

October ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1940

Advances in Resin Technique Open Up New Possibilities

Developments Include Tung Oil Substitution, Better Coatings

Recent developments in the field of natural and synthetic resins have opened up new possibilities in the manufacture of protective and decorative coatings, according to Mr. A. J. Wittenberg of Stroock & Wittenberg.

A typical advance, it is said, is the development of special resins that have made possible the production of porcelain-like baking finishes to replace vitreous enamels, and of gloss and high-speed printing inks.

Used With Newer Drying Oils

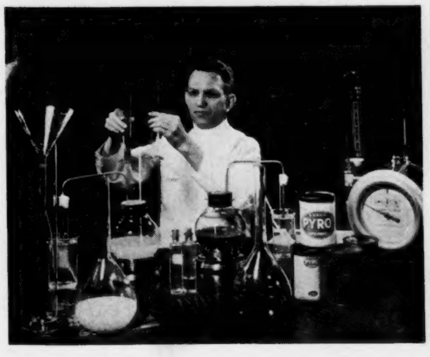
Even more important to the manufacturers of paint, varnish, and printing ink have been the advances in the field of China wood oil substitution. Until recently, many of the wood oil substitutes were not entirely satisfactory from the standpoint of bodying and drying speeds, film hardness, and alkali and water resistance. At the present time, however, dehydrated castor, linseed, and even fish and soya bean oils are being successfully fortified by a group of resins that differ considerably from the conventional pure and modified phenolics.

Alkyds of varying oil and resin modifications and lengths are also reported to be establishing their value in providing acceptable substitutes for tung oil in the present shortage.

Super PYRO Anti-Freeze Superior to Methanol

Since exhaustive tests made by an impartial laboratory prove that methanol anti-freeze loses its protection at a much faster rate than Super PYRO, U.S.I. for the 1940-41 winter recommends that motorists use its Super PYRO anti-freeze for better and more economical protection.

Retailing for $1 per gal., Super PYRO is advertised to protect most cars in most climates for the entire season at a total cost of $1.50. For example, a 1940 Buick with 3½ gal. radiator capacity at —10° F. temperature would require 1½ gal. of Super PYRO, costing $1.50. Most cars have thermostatically controlled cooling systems. Therefore, very



Tests show that the rate of anti-freeze protection loss is 260% faster with methanol than with Super PYRO.

(*Continued on next page*)

Many U.S.I. Products Used in Formulating Lacquers, Varnishes

Ethyl and Butyl Acetates Are Among the Most Popular Solvents; S.D. Alcohol, Solox, Dialkyl Phthalates Also Widely Employed

U.S.I.'s extensive list of solvents and chemicals — produced by continuous large-scale processes that result in consistently high quality — offers valuable assistance to the paint, varnish, and lacquer industry in formulating coatings.

Among the most important U.S.I. products used in lacquer formulations are Ethyl Acetate and Butyl Acetate. Ethyl Acetate is probably the most versatile and widely used of all nitrocellulose solvents, because of its low cost, high solvent power, and compatibility with practically all resins, plasticizers, diluents, and other solvents in common use. It is manufactured by U.S.I. by a continuous process from almost chemically pure raw materials, thus insuring a uniformly high quality product.

Applications of Butyl Acetate

Because of its relatively fast evaporation rate, Ethyl Acetate is usually combined with medium or high boiling solvents to provide proper leveling and to prevent blushing. Among the medium boiling solvents, Normal Butyl Acetate is as popular in its group as is Ethyl Acetate in the low boiling group. Normal Butyl Acetate is characterized by good solvent power for nitrocellulose and ethyl cellulose, favorable evaporation rate, and high blush resistance.

Another widely used U.S.I. product is Amyl Acetate, extensively employed in lacquers to insure proper blending, gloss, flow, and film strength, and to prevent blushing. It is manufactured by U.S.I. in three grades—Commercial, High Test, and Technical.

Alcohols and Alcohol-Type Solvents

Both Ethyl Alcohol and Butyl Alcohol also enter into lacquer formulation. U.S.I. manufactures denatured alcohol in several formulas authorized for use in lacquers, synthetic resin varnishes, spirit varnish, and shellac varnish. Butyl Alcohol, produced by a method developed by U.S.I., is widely used as a latent solvent for nitrocellulose and as a solvent for ethyl cellulose, as well as for many resins.

In addition, the lacquer industry finds

(*Continued on next page*)

Paint Convention To Be Held This Month

The National Paint, Varnish and Lacquer Association will hold its 1940 convention at the Mayflower Hotel in Washington, from October 30 to November 1. The convention immediately follows that of the Federation of Paint and Varnish Production Clubs, which will open at the same hotel on October 28.

Those attending the convention are invited to visit the Stroock & Wittenberg booth and see its interesting exhibits.

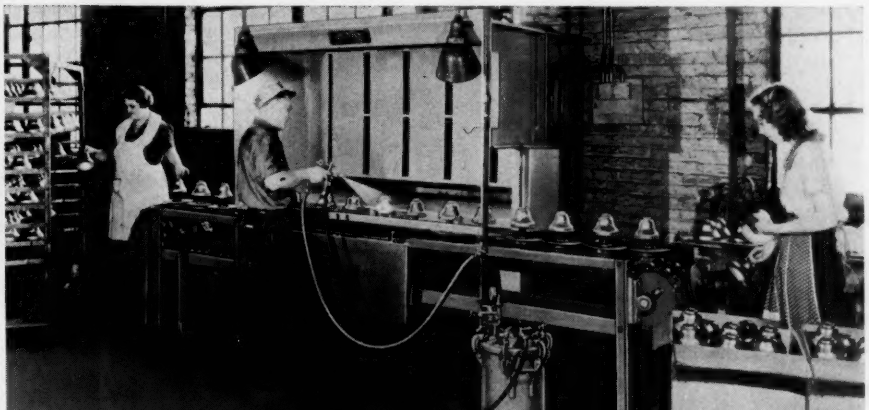
'41 Cars Make Wide Use Of Iridescent Finishes

DETROIT, Mich.—A very marked increase in the use of iridescent finishes is the most striking development in the coatings for the 1941 car models, it is reported here.

These very attractive iridescent effects are obtained by adding aluminum bronze to the pigmented finish, it is said. Finishes of this type have been used in previous years to a limited extent, but it is estimated that 65% of the new models will use the metallic finishes. Both nitrocellulose and synthetic resins are employed as bases for the iridescent finishes.

The finishes are sprayed with a heavy solution, so that when the drying film becomes semi-solid the microscopic particles of aluminum bronze stand up on the finish.

Another development is the wider use of the two-tone effects which made their appearance during the latter part of last season.



Modern finishing requirements call for the highest quality of lacquer materials. U.S.I.'s continuous large-scale processes for the production of essential lacquer ingredients insure the necessary uniformity and purity, and assist the lacquer manufacturer to meet exacting standards.

October ★ **U.S.I. CHEMICAL NEWS** ★ 1940

Solvent Uniformity Boosts Safety Margin in Lacquers

Consistent quality of the solvents that enter into lacquer formulation have a marked effect on the "margin of safety"—a factor that is almost as important in lacquers as in bridge-building. Such factors as attractive colors and smoothness of flow are of little value if difficulty is experienced with the lacquer at high temperatures or humidities.

Ethyl Acetate is a typical instance of the way in which solvent uniformity can affect the margin of safety in lacquers. In the widely used commercial grade, permissible variation in the ester content is from 85 to 88%. This allows a variation amounting to almost 4% of the total ester supplied, while still meeting specifications. It is obvious that such a variation will affect the margin of safety.

By using a unique, patented method of manufacture, U.S.I. is enabled to offer, year after year, Ethyl Acetate of an exceptionally high grade of uniformity, eliminating this wide variation in ester content. Tests taken over a six-months' period on regular production runs of U.S.I. Ethyl Acetate clearly indicate the high uniformity of the product. Lacquer manufacturers can profit by this uniformity in maintaining their margin of safety.

U.S.I. Products for Lacquers

(Continued from previous page)

many uses for Solox, U.S.I.'s proprietary alcohol-type solvent. Nitrocellulose lacquers are frequently formulated with Solox, and a mixture of 20% Solox and 80% toluol is a very powerful solvent for ethyl cellulose. A mixture of Solox and ethylene dichloride is widely used in cellulose acetobutyrate lacquers, and Solox in combination with toluol may be used to replace denatured alcohol as a diluent in cellulose acetate lacquers. Moreover, Solox dissolves many gums and resins, and hence is extensively employed in spirit varnishes.

Other U.S.I. Products

Other U.S.I. products employed in lacquer formulation include the popular plasticizers, Diamyl Phthalate and Dibutyl Phthalate, which are compatible with other lacquer constituents, practically colorless and odorless, stable to light and heat, and remain permanently in the film.

Among the relatively high boiling solvents, Amyl Propionate and Butyl Propionate impart high gloss, leveling out properties, and blush resistance.

U.S.I. will gladly give further information on the use of any of these products in the manufacture of varnishes and lacquers.

New Yellows, Reds, Greens Display Many Advantages

NIAGARA FALLS, N. Y.—Use of lead cyanamide as a new yellow pigment is suggested in a patent granted to an inventor here.

According to the inventor, the pigment is suitable for use in paints, nitrocellulose lacquers, synthetic resin enamels, and printing inks. In addition to high opacity, tinctorial strength, covering power, and light-fastness, the pigment is said to have the added advantage of imparting corrosion-inhibiting qualities to coating compositions.

HALEDON, N. J.—Recently developed Indanthrene Reds and Maroons can be freely diluted with white without suffering loss on exposure to light, it is reported.

NEWARK, N. J.—A new green pigment announced by a manufacturer here is described as permanent, inert in rubber, resistant to acid and alkali.

High Quality of U.S.I. Pure Alcohol Factor in Wider Use

Exceeding U.S.P. standards in quality and purity, U.S.I. Pure Alcohol is in increasing demand by the manufacturers of food flavoring, drugs, and pharmaceuticals, as well as by hospitals and scientific institutions.

Extensive production facilities and ample stocks located in convenient warehouses place U.S.I. in a favorable position to meet this increasing demand.

Super PYRO Proves Merit

(Continued from previous page)

little, if any, replacement has to be made.

According to a certified report of an independent research organization, ". . . the rate of anti-freeze protection loss is 2.6 times faster with methanol than with Super PYRO . . ." After repeated hourly observations, under conditions duplicating those of a cooling system, with the engine shut off and the temperature rising to 180° F., 22.2 milliliters of methanol had distilled off, but only 8 milliliters of Super PYRO. It was found, too, the freezing point of Super PYRO was 30° lower than that of methanol, also that even with only a 7% mixture of Super PYRO no solid freeze can occur in the cooling system to cause costly and dangerous failures.

Thousands of billboards reaching 16 million motorists in over 500 cities and towns will be employed this fall to advertise the "No Boil-Away" feature of Super PYRO. Super PYRO will be offered in 54-gal. and 5-gal. drums and 1-gal. and 1-quart cans.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

A protective coating recently patented is reported to be suitable for covering printing or designs on the surface of cellulose acetate. It is said that the coating forms a cellulose acetate film over the printing. **(No. 380)**

U S I

A new proportioner is said to employ the pressure difference between pitot tubes to give accurate proportioning without the use of pumps. Model is reported to incorporate many improvements over previous types. **(No. 381)**

U S I

Phosphorated oils are said to have many advantages over sulfonated oils, and to be suitable for use as emulsifying agents, dispersants, penetrants, and wetting agents. Suggested applications include printing inks, textiles, paper, leather, and cosmetics. **(No. 382)**

U S I

A liquid cleaner for steel, aluminum, terne plate, and galvanized metal is reported to contain phosphoric acid, compatible solvents, and other ingredients. It is claimed that the cleaner removes dirt and grease, imparts rust-inhibiting properties, gives good bond between metal and finishing material. **(No. 383)**

U S I

A non-volatile solvent is said to remove gum deposits, carbon deposits, and grease, and to be suitable for use as a cleaner on carburetors, fuel pumps, and oil cylinders. **(No. 384)**

U S I

An adhesive solution is reported to be intended for application over the surface of cellophane and similar materials. Maker says that it is colorless and chemically inert, will not dry out, can be used for sticking the cellophane either to itself or to other materials. **(No. 385)**

U S I

A synthetic fiber is used to make filter fabrics that reduce the need of replacement, according to the manufacturer. It is said that the material can be used with pigments, caustics, dyestuffs, and many other products. **(No. 386)**

U S I

A new hose is said to have a synthetic rubber inner tube impervious to paints and solvents, a 2-ply carcass, and a rubber-compound jacket with high tensile strength and resistance to aging and abrasion. **(No. 387)**

U S I

Matching original colors in re-enameling is said to be simplified by the use of a new deopacifying agent. It can be used, it is reported, in white frit in amounts ranging from 2 to 8 ounces per hundred pounds. **(No. 388)**

U S I

A marking ink used with a stamp pad is said to be suitable for use on many kinds of non-absorbent surfaces, including metals, celluloid, varnished wood, coated paper, and plastics. **(No. 389)**

RAW MATERIALS

Supply Situation Helps Imported Items

Teaseed In Good Demand As Olive Oil Substitute—Wide Inquiry On Chinawood Doesn't Always Mean Business—Drying Oils Hold Ground—Carnauba Fluctuates—Rosin Sluggish

RAW materials market showed strength far beyond the interest of buyers during September. Although normal seasonal improvement helped matters the accent was on supply as far as the price structure was concerned. Teaseed oil, long neglected, woke up suddenly when consumers began substituting it for olive oil. Price of the latter was sent soaring by the British blockade. Little, if any, material is getting through.

Some doubt is held in authoritative quarters that teaseed as an olive oil substitute represents a permanent answer to the situation. It is pointed out that with China the originating point of the item, teaseed suppliers are in no enviable position. Recent orders have already taken a good bite out of current stocks.

Inquiries On Chinawood

Inquiry continues active on chinawood. Good opinions have been obtained that much of it is market checking. Key to this angle is that business never passes in any given period commensurate with the seeming prospective buying interest. There is little independent material available. Stocks in China are reported at a point sufficiently low to cushion the market at its present level.

Drying oils have held their ground during the period under review. This, in the face of only moderate buying. Linseed was taken well by contract buyers, but competitive conditions were noted on new business.

Carnauba wax is on the price seesaw. After gaining during the early days of the month, it turned soft during latter half, but still maintained part of its rise.

Shellac, reversing the trend in oils, seems to be suffering from an over-supply. Shipments have been moving steadily to the domestic market, but this, evidently, cannot take up the slack occasioned by the European markets being shot from under suppliers.

Naval Stores Market

Toward month's end, orders for turpentine came into Savannah from England running to around 2,000 barrels. This gave rise to speculation as to whether some stores in the heavily bombed dock areas of London and Liverpool had felt the ravages of war.

Important Price Changes

	Aug. 31	Sept. 30
ADVANCED		
Benzoin, Sumatra, U.S.P.	$0.18	$0.21
Irish Moss	.15	.22
Oil, chinawood	.26	.26¼
Neatsfoot	.06⅞	.07½
Oiticica	.17½	.18½
Tallow	.03⅜	.03¾
Turpentine spirits, Sav.	.24½	.24¾
Wax, Carnauba, No. 1 yellow	.70	.71
DECLINED		
Gum copal, Macassar palebold	$0.13⅞	$0.12¾
Elemi	.10½	.08½
Sandarac	.40	.37
Wax, Ceresin, dom.	.11½	.11
Japan	.15½	.15

Domestically, movement of naval stores aroused no cheers from dealers, although turpentine market is considered in a most favorable position. Rosin could muster but slight interest among buyers for greater part of the month, but interest turned more lively during the last week.

Rumors were rampant that investigations were underway on irregularities in connection with government loans on rosin. Detailed story of this situation is contained in the general news section.

Fertilizer Prices Low

Contrary to the sharp advance in price of fertilizer during the last World War, demands of the present war and national defense program have not so far boosted the cost of fertilizer to the farmer. "New developments in science and technology such as the production of synthetic nitrogen has reduced production costs and prices," says the United States Department of Agriculture in a report which also points out that according to 1910-1914 average the price of fertilizer is considerably lower than the prices of most commodities bought by farmers.

Smith Agricultural Honored

Smith Agricultural Co. was recently honored in a broadcast over Station WHKC, Columbus, O., which traced development of the company since its founding 50 years ago.

AGRICULTURAL CHEMICALS

Little News In Unchanged Market

Tightness of Ammonia Sulfate Is Unrelieved—Bagged Nitrate Prices Raised 40c Following Chile's Lead—Minor Items Firm—Potash Demand Unflagging; Producers Moving Cautiously

LITTLE of interest transpired in this market during the month just closed. Tight situation on sulfate of ammonia remains unrelieved. Plenty of exporters are around with offers of $10 over the market. Thus, consumers without contracts are in competition with these buyers on spot material. Best reports are however, that no business is passing at the premium figure. Capacity production is more than sold up.

New price differentials on domestic bagged nitrate of soda were released for October to June, up 40c. Differential schedule now reads $1.70 per ton in 200 lb. bags and $2.40 per ton in 100 lb. bags. Boost represents increased cost of bags and handling. This move merely follows new differentials released on Chilean product month previous.

Notable trend developing during period under review was firming up of minor items. Organic materials found better demand, especially during first half of the month. Unquestionably some part of this can be traced to curtailed slaughter in South America.

Important Price Changes

	Aug. 31	Sept. 30
ADVANCED		
Blood, dried, N. Y.	$2.25	$2.40
Fish scrap, dried unground	3.10	3.15
Tankage, ground, N. Y.	2.35	2.50
DECLINED		
Linseed Meal, ton	$25.00	$23.50

Potash and its salts remain in good demand. In fact, due to stoppage of imports, some consumers formerly supplied from abroad are being shut out by producers whose present capacities are taken up by current contracts. Production is being expanded, and no doubt, there will be sufficient material to go around. However, producers are reluctant to go into heavy expenditures for plants and equipment to take care of business that may go back to its original source as soon as the seas open up. This isn't cynicism, but the result of a lesson well learned after the last war.

Superphosphate maintains its good position. Bone meal is on a nominal basis. Fish scrap moved evenly.

Heavy Chemicals, Coal-Tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

PRICES CURRENT

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1939 Average $1.24 - Jan. 1940 $1.17 - Sept. 1940 $1.22

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Acetaldehyde, drs, c-l, wks lb.	...	.11	...	.11	.10	.14
Acetaldol, 95%, 55 gal drs wks lb.	.11	.12	.11	.25	.21	.25
Acetamide, tech, lcl, kgs lb.	.28	.30	.28	.50	.28	.50
Acetanilid, tech, 150 lb bbls lb.	...	.27	...	.27	.22	.29
Acetic Anhydride, drs, f.o.b. wks, frt all'd lb.	.10½	.11½	.10½	.11½	.10½	.11
Acetin, tech, drs lb.	...	.33	...	.33	...	.33
Acetone, tks, f.o.b. wks, frt all'd lb.	...	.05	.05	.06	.04¼	.06
drs, c-l, f.o.b. wks, frt all'd' lb.	...	.06½	.06½	.07½	.05¾	.07¼
Acetyl chloride, 100 lb cbys lb.	.55	.68	.55	.68	.55	.68
ACIDS						
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs.	...	2.23	...	2.23	...	2.23
glacial, bbls, c-l, wks 100 lbs.	...	7.62	...	7.62	...	7.62
glacial, USP bbls, c-l, wks, 100 lbs.	...	10.25	...	10.25	...	10.25
Acetic Acid Glacial, *Synthetic* 99.5%, cbys, cases, delv lb.	...	.0918	...	...	...	...
99.5%, 110-gal dr, delv lb.	...	.0843	...	...	...	...
USP XI, cases, cbys, delv lb.	...	.11	...	...	...	...
USP XI, 110-gal drs, delv lb.	.10¼	.11	...	...	...	...
CP, cases, cbys, delv lb.	.13½	.14	...	...	...	...
CP, 55-gal drs, delv lb.	.13¼	.13½	...	...	...	...
Acetylsalicylic, USP, 225 lb bbls lb.	...	.45	...	.45	.40	.50
Adipic, kgs, bbls lb.	...	.31	.31	.72	...	.72
Anthranilic, ref'd, bbls lb.	1.15	1.20	1.15	1.20	1.15	1.20
tech bbls lb.	.	.75	...	.75	...	.75
Ascorbic, bot oz.	2.00	2.05	2.25	3.00	2.75	3.25
Battery, cbys, wks 100 lbs.	1.60	2.55	1.60	2.55	1.60	2.55
Benzoic tech, 100 lb kgs lb.	.43	.47	.43	.47	.43	.47
USP, 100 lb kgs lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv ton *a*	93.50	96.00	...	96.00	...	96.00
Broenner's, bbls lb.	...	1.11	...	1.11	...	1.11
Butyric, edible, c-l, wks, cbys lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs, wks lb.	...	.22	...	.22	...	.22
wks, lcl lb.	...	.23	...	.23	...	.23
tks, wks lb.	...	.21	...	.21	...	.21
Caproic, normal, drs lb.	.30	.35	.35	.40	...	.35
Chicago, bbls lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks lb.	.03½	.05	.03½	.05	.03½	.05
Chromic, 99¾%, drs, delv lb.	.15¼	.17¼	.15¼	.17¼	.15¼	.17¼
Citric, USP, crys, 230 lb bbls lb. *b*	.20	.21	.20	.21½	.20	.22½
anhyd, gran bbls lb *b*	...	.23	...	.23	.23	.25
Cleve's, 250 lb bbls lb.	...	.57	...	.57	...	.57
Cresylic, 99%, straw, HB, drs, wks, frt equal gal.	.68	.70	.68	.70	.49	.70
99%, straw, LB, drs, wks, frt equal gal.	.68	.75	.68	.75	.55	.75
resin grade, drs, wks, frt equal lb.	.08¾	.09¾	.08¾	.09¾	.08¼	.09¾
Crotonic, bbls, delv lb.	.21	.50	.21	.50	.21	.50
Formic, tech, 140 lb drs lb.	.10½	.11½	.10½	.11½	.10½	.11½
Fumaric, bbls lb.	.24	.28	.24	.75	...	.75
Fuming, see Sulfuric (Oleum)						
Gallic, tech, bbls lb.	.90	.93	.75	.93	.70	.73
USP, bbls lb.	.92	.95	.92	.95	.77	.81
H, 225 lb bbls, wks lb.	...	.45		.45	.50	.55
Hydriodic, USP, 47% lb.	...	2.42	2.30	2.42	...	2.30
Hydrobromic, 34% conct 155 lb cbys, wks lb.	.35	...	.35	.44	.42	.44
Hydrochloric, see muriatic						
Hydrofluoric, 30%, 400 lb bbls, wks lb.	.06	.06½	.06	.06½	.06	.07½
Hydrofluosilicic, 35%, 400 bbls, wks lb.	.09	.09¼	.09	.09½	.09	.09½
Lactic, 22%, dark, 500 lb bbls lb.	.02½	.03¼	.02½	.03¾	.02½	.02¾
22%, light ref'd, bbls lb.	.03½	.04¾	.03½	.04¾	.03½	.03¾
44%, light, 500 lb bbls lb.	.05½	.06¾	.05½	.06¾	.05½	.05¾
44%, dark, 500 lb bbls lb.	.06½	.07¾	.06½	.07¾	.06½	.06¾
50%, water white, 500 lb bbls lb.	.10½	.11½	.10½	.11½	.10½	.11½
Lauric, drs lb.	.11½	.12	.12½	.14½	.11¾	.12¼
Laurent's, 250 lb bbls lb.	...	.45	.45	.46	.45	.46
Maleic, powd, kgs lb.	...	.30	.30	.40	.30	.40
Malic, powd, kgs lb.	...	.47	...	.47	.45	.60
Mixed, tks, wks N unit	.05	.06	.05	.07¼	.06½	.07¼
S unit	.0085	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.15	.18	.15	.18	.16	.18
Monosulfonic, bbls lb.	...	1.50	1.50	1.60	1.50	1.60

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.; *y* Price given is per gal.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.	...	1.50	...	1.50	...	1.50
tks, wks 100 lb.	...	1.05	1.00	1.05	...	1.00
20°, cbys, c-l, wks 100 lb.	...	1.75	...	1.75	...	1.75
tks, wks 100 lb.	...	1.15	1.10	1.15	...	1.10
22°, c-l, cbys, wks 100 lb.	...	2.25	...	2.25	...	2.25
tks, wks 100 lb.	...	1.65	1.60	1.65	...	1.60
CP, cbys lb.	.06½	.08	.06½	.08	.06½	.07½
N & W, 250 lb bbls lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s.v., drs lb.	.10	nom.	nom.	.14	.10	.14
Naphthionic, tech, 250 lb bbls lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks 100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks 100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv lb.	.11½	.13	.11½	.13	.11½	.12½
Oxalic, 300 lb bbls, wks, or N Y lb.	.10¾	.12	.10¾	.12	.10¾	.12
Phosphoric, 85%, USP, cbys lb.	...	.12	.12	.14	.12	.14
50%, acid, c-l, drs, wks lb.	...	.12	.06	.12	.06	.08
75%, acid, c-l, drs, wks lb.	...	.07½	...	.07½	...	.07½
Picric, kgs, wks lb.	...	.35	.35	.40	.35	.40
Propionic, 98% wks, drs lb.	...	.25	...	.25	...	.22
80% lb.	.14	.20	...	.20	.16	.17½
Pyrogallic, tech, lump, pwd, bbls lb.	...	1.20	1.05	1.20	1.45	1.63
cryst, USP lb.	1.70	2.25	1.55	2.25	1.55	2.10
Ricinoleic, bbls lb.	.27	.33	.27	.33	...	.35
Salicylic, tech, 125 lb bbls, wks lb.	...	.33	...	.33	...	.33
USP, bbls lb.	.35	.40	.35	.40	.35	.40
Succinic, bbls lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	...	.17	.17	.18	.17	.18
Sulfuric, 60°, tks, wks ton	...	13.00	...	13.00	...	13.00
c-l, cbys, wks 100 lb.	...	1.25	...	1.25	...	1.25
66°, tks, wks ton	...	16.50	...	16.50	...	16.50
c-l, cbys, wks 100 lb.	...	1:50	...	1.50	...	1.50
CP, cbys, wks lb.	.06½	.08	.06½	.08	.06½	.07½
Fuming (Oleum) 20% tks, wks ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls lb.	.54	.56	.44	.56	.40	.47
Tartaric, USP, gran, powd, 300 lb bbls lb.	.41¼	.42¼	.35¼	.42¼	.27½	.31¼
Tobias, 250 lb bbls lb.	.55	.60	.55	.60	.55	.67
Trichloroacetic bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
kgs lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls lb.	no prices		no prices		1.70	1.80
Albumen, light flake, 225 lb. bbls lb.	.55	.62	.55	.62	.52	.68
dark, bbls lb.	.13	.18	.13	.18	.13	.18
egg, edible lb.	.54	.60	.53	.62	.58	.78
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv lb.	...	.101	...	.101	...	.101
c-l, drs, delv lb.	...	.111	...	.111	...	.111
lcl, drs, delv lb.	...	.121	...	.121	...	.121
Amyl, normal l-c-l drs	...	.08½	...	.08½	...	.08½
Wyandotte, Mich. lb.	...	.25	...	...	...	...
secondary, tks, delv lb.						
drs, c-l., delv E of Rockies lb.	...	.09½	...	09½	...	.09½
Benzyl, cans lb.	...	.68	.68	1.00	.68	1.00
Butyl, normal, tks, f.o.b. wks, frt all'd lb. *d*	...	.08	...	.09	.07	.09
c-l, drs, f.o.b. wks, frt all'd lb. *d*	...	.09	...	.10	.08	.10
Butyl, secondary, tks, delv lb. *d*	...	.06½	...	.06½	.05½	.06½
c-l, drs, delv lb. *d*	...	.07½	...	.07½	.06½	.07½
Capryl, drs, tech, wks lb.	...	.85	...	.85	...	.85
Cinnamic, bottles lb.	2.00	2.50	2.00	2.50	2.00	2.50
Denatured, CD, 14, c-l drs, wks gal. *e*	.31½	.36½	.31½	.36½	.27½	.36½
tks, East, wks gal.	...	.25½	...	.25½	.21½	.25½
Western schedule, c-l, drs, wks gal. *e*	...	.36½	.34½	.36½	.34½	.37
c-l, drs, wks gal. *e*	...	.26½	.21½	.26½	.19½	.22
Denatured, SD, No. 1, tks,	...	.22½	...	.22½	.25½	28½
Diacetone, pure, c-l, drs, delv lb. *f*	...	.09½	...	.12	.09	.12
tech, contract, drs, c-l, delv lb.	...	.11½	...	.11½	.08½	.11½

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Alcohols (continued):						
Ethyl, 190 proof, molasses,						
tks ... gal. g	...	5.92½	...	5.92½	4.46	4.48½
c-l, drs ... gal. g	...	5.98½	...	5.98½	4.49	4.54½
c-l, bbls ... gal. g	...	5.99½	...	5.99½	4.53	4.55½
Furfuryl, tech, 500 lb drs lb.	...	.35	.25	.35	.25	.35
Hexyl, secondary tks, delv lb.	...	.12	...	.12	...	.12
c-l, drs, delv ... lb.	...	.13	...	.13	...	.13
Normal, drs, wks ... lb.	3.25	3.50	3.25	3.50	3.25	3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	...	.32
drs, lcl, delv ... lb.	...	.27	...	.27	...	.27
Isobutyl, ref'd, lcl, drs .. lb.	...	.073	...	.073	.073	.09
c-l, drs ... lb.	...	.069	...	.069	.068	.08½
tks ... lb.	...	.059	...	.059	...	.07½
Isopropyl, refd, 91%, c-l, drs, f.o.b. wks, frt all'd ... lb.	...	.65	...	.65	...	.36
Ref'd 98%, drs, f.o.b. wks, frt all'd ... gal.	...	.65	...	.65	...	.41
Tech 91% drs, above terms ... gal.	...	.33½	...	.33½	...	.33½
tks, same terms ... gal.	...	.28½	...	.28½	...	.28½
Tech 98%, drs, above terms ... gal.	...	.36	.36	.37½	...	.37½
tks, above terms ... gal.	...	.31	.31	.32½	...	.32½
Spec. Solvent, tks, wks gal.	...	.23½	...	.23½	.19	.23½
Aldehyde ammonia, 100 gal drs ... lb.	.65	.70	.65	.82	.80	.82
Aldehyde Bisulfite, bbls, delv ... lb.	...	.17	...	.17	...	.17
Aldol, 95%, 55 and 110 gal, drs, delv ... lb.	.11	.12	.11	.12	.11	.20
Alphanaphthol, crude, 300 lb bbls ... lb.	...	.52	...	.52	...	.52
Alphanaphthylamine, 350 lb bbls ... lb.	...	.32	.32	.34	.32	.34
Alum, ammonia, lump, c-l, bbls, wks ... 100 lb.	...	3.75	...	3.75	3.40	3.75
delv NY, Phila ... 100 lb.	...	3.75	...	3.75	3.40	3.75
Granular, c-l, bbls wks ... 100 lb.	...	3.50	...	3.50	3.15	3.50
Powd, c-l, bbls, wks 100 lb.	...	3.90	...	3.90	3.55	3.90
Chrome, bbls ... 100 lb.	no prices		6.50	6.75	6.50	6.75
Potash, lump, c-l, bbls, wks ... 100 lbs.	...	4.00	...	4.00	3.65	4.00
Granular, c-l, bbls, wks ... 100 lb.	...	3.75	...	3.75	3.40	3.75
Powd, c-l, bbls, wks 100 lb.	...	4.15	...	4.15	3.80	4.15
Soda, bbls, wks ... 100 lb.	...	3.25	...	3.25	...	3.25
Aluminum metal, c-l, NY 100 lb.	...	18.00	18.00	20.00	...	20.00
Acetate, 20%, bbls ... lb.	.08	.09	.07½	.09	.07½	.09
Basic powd, bbls, delv lb.	.35	.50	.35	.50	.40	.50
32% basic, bbls, delv lb.	.09½	.12	...	...	...	...
Insoluble basic powder, bbls, delv ... lb.	...	.40	...	...	...	...
Soluble normal pwdr lb.	...	.22	...	...	...	...
Soluble basic powder lb.	...	.33	...	...	...	...
Chloride anhyd, 99% wks lb.	.08	.12	.08	.12	.06	.12
93%, wks ... lb.	.05	.08	.05	.08	.05	.08
Crystals, c-l, drs, wks lb.	.06	.06½	.06	.06½	.06	.06½
Solution, drs, wks ... lb.	.02¾	.03¼	.02¾	.03¼	.02¾	.03¼
Formate, 30% sol bbls, c-l, delv ... lb.	...	.13	...	.13	...	.13
Hydrate, 96%, light, 90 lb bbls, delv ... lb.	.12½	.13	.12½	.13½	.11½	.13
heavy, bbls, wks ... lb.	.029	.03½	.029	.03½	.029	.03½
Oleate, drs ... lb.	.17½	.20	.16¾	.20	.16¾	.18½
Palmitate, bbls ... lb.	.20½	.21½	.20½	.24½	.23	.24½
Resinate, pp., bbls ... lb.	...	.15	...	.15	...	.15
Stearate, 100 lb bbls ... lb.	.18	.19	.19	.20	.16	.22½
Sulfate, com, c-l, bgs, wks ... 100 lb.	...	1.15	...	1.15	...	1.15
c-l, bbls, wks ... 100 lb.	...	1.35	...	1.35	...	1.35
Sulfate, iron-free, c-l, bags, wks ... 100 lb.	...	1.60	1.60	1.80	...	1.45
c-l, bbls, wks ... 100 lb.	...	1.80	1.65	1.80	...	1.65
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	...	1.15
Ammonia anhyd fert com, tks lb.	...	.06	.04½	.06	.04½	.05½
Ammonia anhyd, 100 lb cyl lb.	...	.16	...	.16	...	.16
50 lb cyl ... lb.	...	.22	...	.22	...	.22
26°, 800 lb drs, delv ... lb.	.02¼	.02½	.02¼	.02½	.02¼	.02½
Aqua 26°, tks, NH$_3$ cont.	...	.05¼ z	.04	.05¼	...	.04 z
Ammonium Acetate, kgs .. lb.	.27	.33	.27	.33	.26	.33
Bicarbonate, bbls, f.o.b. wks ... 100 lb.	...	5.56	...	5.56	5.15	5.71
Bifluoride, 300 lb bbls .. lb.	.14½	.16½	.14½	.16½	.14½	.16½
Carbonate, tech, 500 lb bbls ... lb.	.08	.11	.08	.11	.08	.12
Chloride, White, 100 lb bbls, wks ... 100 lb.	4.45	...	4.45	4.90	4.45	4.90
Gray, 250 lb. bbls, wks ... 100 lb.	5.50	5.75	5.50	6.25	5.50	6.25
Lump, 500 lb cks spot lb.	.10½	.11	.10½	.11	.10½	.11
Lactate, 500 lb bbls ... lb.	.15	.16	.15	.16	.15	.16
Laurate, bbls ... lb.	...	.23	...	.23	...	.23
Linoleate, 80% anhyd, bbls ... lb.	...	.12	...	.12	.11	.15
Naphthenate, bbls ... lb	...	.17	...	.17	...	.17
Nitrate, tech, bbls ... lb.	...	.0455	...	.0455	.036	.0455
Oleate, drs ... lb.	...	.14	...	.14	.11	.14
Oxalate, neut, cryst, powd, bbls ... lb.	.19	.25	.19	.25	.19	.20
Perchlorate, kgs ... lb.	.17	nom.	.17	.19	...	.16
Persulfate, 112 lb kgs .. lb.	.21	.22	.21	.22	.21	.24
Phosphate, diabasic tech, powd, 325 lb bbls ... lb.	.07¼	.09¼	.07¼	.10	.07½	.10
Ricinoleate, bbls ... lb.	...	.15	...	.15	...	.15
Stearate, anhyd, bbls .. lb.	...	.24½	...	.24½	.22	.24½
Paste, bbls ... lb.	...	.06½	...	.06½	.06½	.08

g Grain alcohol 25c a gal. higher in each case. ** On a delv. basis.
z On a f.o.b. wks. basis.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Ammonium (continued):						
Sulfate, dom, f.o.b., bulk ton	...	28.00	...	28.00	27.00	28.00
Sulfocyanide, pure, kgs .. lb.	...	.65	...	.65	.55	.65
Amyl Acetate (from pentane)						
tks, delv ... lb.	...	.095	...	.095	.095	.10
c-l, drs, delv ... lb.	...	.105	...	.105	.105	.11
lcl, drs, delv ... lb.	...	.115	...	.115	.115	.11½
tech drs, delv ... lb.	...	.12½	...	.12½	.10½	.12½
Secondary, tks, delv .. lb.	...	.08½	...	.08½	...	.08½
c-l, drs, delv ... lb.	...	.09½	...	.09½	...	.09½
tks, delv ... lb.	...	.08½	...	.08½	...	.08½
Chloride, norm, drs, wks lb.	.56	.68	.56	.68	.56	.68
mixed, drs, wks ... lb.	.0535	.0665	.0535	.0665	.0565	.077
tks, wks ... lb.	...	.0465	...	.0465	.0465	.06
Mercaptan, drs, wks ... lb.	...	1.10	...	1.10	...	1.10
Oleate, lcl, wks, drs .. lb.	...	.25	...	.25	...	.25
Stearate, lcl, wks, drs .. lb.	...	.26	...	.26	...	.26
Amylene, drs, wks ... lb.	.102	.11	.102	.11	.102	.11
tks, wks ... lb.	...	.09	...	.09	...	.09
Aniline Oil, 960 lb drs and tks ... lb.	...	.14½	...	.14½	.14½	.17½
Annatto fine ... lb.	.34	.39	.34	.39	.34	.39
Anthracene, 80% ... lb.	...	.55	...	.55	.55	.75
Anthraquinone, sublimed, 125 lb bbls ... lb.	...	.65	...	.65	...	.65
Antimony metal slabs, ton lots ... lb.	...	.14	...	.14	.11¼	.14
Butter of, see Chloride.						
Chloride, soln, cbys ... lb.	...	.17	...	.17	...	.17
Needle, powd, bbls ... lb.	.20	.22	.18	.22	.12	.20
Oxide, 500 lb bbls ... lb.	.13	.14	.13	.15¾	.10	.15¾
Salt, 63% to 65%, tins lb.	...	.30	.42	nom.	.25¾	.42
Archil, conc, 600 lb bbls .lb.	no prices		no prices		.21	.27
Double, 600 lb bbls ... lb.	no prices		no prices		.18	.20
Aroclors, wks ... lb.	.18	.30	.18	.30	.18	.30
Arrowroot, bbls ... lb.	.09½	.10	.09	.10	.08½	.09
Arsenic, Metal ... lb.	no prices		...	...	.40	.60
Red, 224 lb cs kgs ... lb.	no prices		.17½	.18	.18	.19
White, 112 lb kgs ... lb.	.03¼	.04	.03	.03¼	.03	.03¼
B						
Barium Carbonate precip, 200 lb bgs, wks ... ton	52.50	55.00	52.50	62.50	52.50	62.50
Nat (witherite) 90% gr, c-l, wks, bgs ... ton	45.00	47.00	45.00	47.00	41.00	47.00
Chlorate, 112 lb kgs, NY lb.	.25	.30	.20	.26	.16½	.25
Chloride, 600 lb bbls, delv, zone 1 ... ton	77.00	92.00	77.00	92.00	77.00	92.00
Dioxide, 88%, 690 lb drs lb.	...	.10	.10	.12	.11	.12
Hydrate, 500 lb bbls ... lb.	.06½	.07	.06½	.07	.04½	.05½
Nitrate, bbls ... lb.	.08½	.10½	.09½	.10½	.06¾	.10½
Barytes, floated, 350 lb bbls c-l, wks ... ton	...	25.15	...	25.15	...	23.65
Bauxite, bulk, mines ... ton	7.00	10.00	7.00	10.00	7.00	10.00
Bentonite, c-l, 325 mesh, bgs, wks ... ton	...	16.00	...	16.00	...	16.00
200 mesh ... ton	...	11.00	...	11.00	...	11.00
Benzaldehyde, tech, 945 lb. drs, wks ... lb.	.45	.50	.55	.60	.60	.62
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal.	...	.14	.14	.16	...	.16
90% c-l, drs ... gal.	...	.19	.19	.21	...	.21
Ind pure, tks, frt all'd gal.	...	.14	.14	.16	...	.16
Benzidine Base, dry, 250 lb bbls ... lb.	...	.70	...	.70	.70	.72
Benzoyl Chloride, 500 lb drs lb.	.23	.28	.23	.28	.40	.45
Benzyl Chloride, 95-97% rfd, drs ... lb.	.19	.21	.19	.21	.30	.40
Beta-Naphthol, 250 lb bbls, wks ... lb.	.23	.24	.23	.24	.23	.24
Naphthylamine, sublimed, 200 lb bbls ... lb.	1.25	1.35	1.25	1.35	1.25	1.35
Tech, 200 lb bbls ... lb.	.51	.52	.51	.52	.51	.52
Bismuth metal ... lb.	...	1.25	...	1.25	1.05	1.25
Chloride, boxes ... lb.	3.20	3.25	3.20	3.25	3.20	3.25
Hydroxide, boxes ... lb.	3.35	3.46	3.35	3.46	3.15	3.40
Oxychloride, boxes ... lb.	...	3.10	...	3.10	2.95	3.10
Subbenzoate, boxes ... lb.	...	3.36	3.25	3.36	3.25	3.30
Subcarbonate, kgs ... lb.	1.73	1.76	1.73	1.76	1.43	1.76
Subnitrate, fibre, drs ... lb.	1.48	1.51	1.48	1.51	1.23	1.51
Trioxide, powd, boxes .. lb.	...	3.56	3.56	3.57	...	3.57
Blanc Fixe, 400 lb bbls, wks ton h	35.00	42.50	50.00	80.00	40.00	80.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	2.00	2.85	...	2.85	...	2.00
lcl, drs, wks ... lb.	2.25	3.35	2.25	3.35	2.25	3.60
Blood, dried, f.o.b., NY unit	...	2.40	2.25	3.35	2.50	4.25
Chicago, high grade ... unit	...	2.65	2.00	3.50	2.30	4.25
Imported shipt ... unit	...	2.50	2.25	3.30	2.65	3.90
Blues, Bronze Chinese						
Prussian Soluble ... lb.	...	.33	.33	.37	.33	.37
Milori, bbls ... lb.	.33	.34	.33	.34	.33	.37
Ultramarine,* dry, wks, bbls ... lb.	...	.11	...	.11	...	.11
Regular grade, group 1 lb.	...	.16	...	.16	...	.16
Special, group 1 ... lb.	...	.19	...	.19	...	.19
Pulp, No. 1 ... lb.	.22	.27	.22	.27	...	.27
Bone, 4½ + 50% raw, Chicago ... ton	...	30.00	30.00	33.00	27.00	35.00
Bone Ash, 100 lb kgs ... lb.	.06	.07	.06	.07	.06	.07
Meal, 3% & 50%, imp ton	...	32.50	32.00	32.50	22.00	32.00
Domestic, bgs, Chicago ton	29.00	30.00	29.00	32.00	24.00	32.00
Borax, tech, gran, 80 ton lots, sacks, delv ... ton i	...	43.00	...	43.00	...	43.00
bbls, delv ... ton i	...	53.00	...	53.00	...	53.00

h Lowest price is for pulp, highest for high grade precipitated; i Crystals $6 per ton higher; USP, $15 higher in each case; *Freight is equalized in each case with nearest producing point.

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Borax (continued)					
Tech, powd, 80 ton lots, sacks .... ton *i*	...	48.00	47.00	48.00	...	47.00
bbs, delv .... ton *i*	...	58.00	57.00	58.00	...	57.00
Bordeaux Mixture, drs...lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases ....lb.	.25	.30	.25	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	...	.57	...	.57	.90½	.92½
Gold, blk ....lb.	.60	.65	.60	.65	.45	.65
Butanes, com 16-32° group 3 tks ....lb.	.02½	.03	.02¼	.03¾	.02¼	.03¾
Butyl, Acetate, norm drs, frt all'd ....lb.	...	.09	...	.10	.09	.10
tks, frt all'd ....lb.	...	.08	...	.09	.08	.09
Secondary, tks, frt all'd lb.	...	.06½	...	.06½	.05½	.06½
drs, frt all'd ....lb.	.07½	.08	.07½	.08	.068	.08
Aldehyde, 50 gal drs, wks .... lb.	.15½	.17½	.15½	.17½	.15½	.17½
Carbinol, norm (see Normal Amyl Alcohol)						
Crotonate, norm, 55 and 110 gal drs, delv ...lb.	...	.35	...	.35	.35	.75
Lactate ....lb.	.23½	.24½	.23½	.24½	.22½	.24½
Oleate, drs, frt all'd ..lb.	...	.25	...	.25	...	.25
Propionate, drs ....lb.	.16½	.17	.16½	.17	.16½	.18½
tks, delv ....lb.	...	.15½	...	.15½	.15½	.17
Stearate, 50 gal drs ...lb.	...	.28½	...	.28½	.26½	.28½
Tartrate, drs ....lb.	.55	.60	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	.35½	...	.35½	...	.35½

C

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Cadmium Metal ....lb.	.80	.85	.80	.85	.50	.85
Sulfide, orange, boxes ..lb.	...	.75	.75	.85	.75	.90
Calcium, Acetate, 150 lb bgs c-l, delv ....100 lb.	...	1.90	...	1.90	1.65	1.90
Arsenate, c-l, E of Rockies. dealers, drs ....lb.	.06	.06½	.06	.07¼	.06¾	.07¼
Carbide, drs ....lb.	...	.04¾	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l ....lb.	...	1.00	...	1.00	...	1.00
Chloride, flake, 375 lb drs, burlap bgs, c-l, delv..ton	...	20.50	...	22.00	...	22.00
paper bags, c-l, delv..ton	20.50	35.00	20.50	36.00	23.00	36.00
Solid, 650 lb drs, c-l, delv ....ton	19.00	35.00	19.00	35.00	...	20.00
Ferrocyanide, 350 lb bbls wks ....lb.	...	.20	...	.20	...	.20
Gluconate, Pharm, 125 lb bbls ....lb.	.50	.57	.50	.57	.50	.57
Levulinate, less than 25 bbl lots, wks ....lb.	...	3.00	...	3.00	...	3.00
Nitrate, 100 lb bags ...ton	no prices		28.00	29.00	...	28.00
Palmitate, bbls ....lb.	.22	.24	.22	.24	.22	.23
Phosphate, tribasic, tech, 450 lb bbls ....lb.	.0635	.0705	.0635	.07½	.06½	.07½
Resinate, precip, bbls...lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls...lb.	.20½	.22½	.20½	.22½	.19	.21
Camphor, slabs ....lb.	.82	.83	.82	.84	.46	.77
Powder ....lb.	.82	.83	.82	.84	.45	.47
Carbon Bisulfide, 500 lb drs lb.	.05	.05¾	.05	.05¾	.05	.05¾
Black, c-l, bgs, delv, price varying with zone† ...lb.	...	.03	.02¾	.03¾	.02¾	.03¾
lcl, bgs, f.o.b.whse....lb.	...	.065	...	.065	...	.06¼
cartons, f.o.b. whse.....lb.	...	.065	...	.065	...	.06¼
cases, f.o.b. whse......lb.	...	.07	...	.07	...	.07
Decolorizing, drs, c-l...lb.	.08	.15	.08	.15	.08	.15
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 55 or 110 gal drs, c-l, delv.....lb.	...	.66½	...	.66½	.05	.05½
Casein, Standard, Dom, grd lb.	.11¼	.12¼	.10	.14½	.07	.23
80-100 mesh, c-l bgs....lb.	.11¾	.12¾	.11	.15	.07½	.23½
Castor Pomace, 5½ NH₃, c-l, bgs, wks ....ton	15.00	...	15.00	17.50	16.50	18.50
Imported, ship, bgs....ton	no prices		...	20.00	18.00	18.00
Celluloid, Scraps, ivory cs lb.	.12	.15	.12	.15	.12	.15
Transparent, cs ....lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs .... lb.	...	.30	.30	.34	.35	.36
Chalk, dropped, 175 lb bbls lb.	...	.02¾	.02¾	.03¾	.02¾	.03¾
Precip, heavy, 560 lb cks lb.	...	.03¼	.02¾	.03¼	.02¾	.03¼
Light, 250 lb cks ......lb.	...	.03¼	.03¼	.04	.03¼	.04
Charcoal, Hardwood, lump, blk, wks ....bu.	...	.15	...	.15	...	.15
Softwood, bgs, delv* ...ton	25.00	36.00	25.00	36.00	23.00	36.00
Willow, powd, 100 lb bbls, wks ....lb.	.06	.07	.06	.07	.06	.07
Chestnut, clarified, tks, wks lb.	...	.01¾	...	.01¾	...	.01⅝
25%, bbls, wks ....lb.	...	.02½	...	.02½	...	.02
China Clay, c-l, blk mines ton	...	7.60	7.60	9.50	7.00	7.60
Imported, lump, blk...ton	no prices		...	26.00	22.00	26.00
Chlorine, cyls, lcl, wks, contract ....lb.	...	.07¼	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb *j*	...	.05¼	...	.05¼	.05¼	.05½
Liq. tk, wks, contract 100 lb.	...	1.75	...	1.75	1.75	2.00
Multi, c-l, cyls, wks, cont ....lb.	...	.019	...	.019	1.90	2.15
Chloroacetophenone, tins, wks ....lb.	3.00	3.50	3.00	3.50	3.00	3.50
Chlorobenzene, Mono, 100 lb drs, lcl, wks ....lb.	.06	.08	.06	.08	.06	.07½
Chloroform, tech, 1000 lb drs ....lb.	...	.20	.20	.21	.20	.21
USP, 25 lb tins ......lb.	...	.30	.30	.31	.30	.31
Chloropicrin, comml cyls .lb.	...	.80	...	.80	...	.80
Chrome, Green, CP .....lb.	.21	.25	.21	.25	.21	.25
Yellow ....lb.	.13½	.14½	.13½	.14½	.13½	.15½
Chromium Acetate, 8% Chrome, bbls ....lb.	...	.05¾	...	.05¾	.05	.08
Fluoride, powd, 400 lb bbl ....lb.	.27	.28	.27	.28	.27	.28

j A delivered price; * Depends upon point of delivery; † New bulk price, tank cars ¼c per lb. less than bags in each zone.

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Coal tar, bbls ....bbl.	7.50	7.75	7.50	8.00	7.50	8.00
Cobalt Acetate, bbls .....lb.	...	.80½	...	.80½	.65	.71
Carbonate tech, bbls ...lb.	...	1.58	1.38	1.60	1.25	1.63
Hydrate, bbls ....lb.	...	1.98	...	1.78	...	1.78
Linoleate, solid, bbls ...lb.	...	.33	...	.33	...	.33
paste, 6%, drs ......lb.	...	.31	...	.31	...	.31
Oxide, black, bgs .....lb.	...	1.84	...	1.84	1.67	1.84
Resinate, fused, bbls ...lb.	...	.13½	...	.13½	...	.13½
Precipitated, bbls ....lb.	...	.34	...	.34	...	.34
Cochineal, gray or bk bgs lb.	.37	.38	.37	.38	.35	.38
Teneriffe silver, bgs....lb.	.38	.39	.38	.39	.36	.39
Copper, metal, electrol 100 lb.	...	12.00	11.00	12.00	.10	12.50
Acetate, normal, bbls, wks ....lb.	.22	.24	.22	.24	.21	.24
Carbonate, 52-54% 400 lb. bbls ....lb.	...	.1650	.1570	.169	.14½	.169
Chloride, 250 lb bbls ...lb.	...	.16	.16	.18	.12½	.18
Cyanide, 100 lb drs ....lb.	...	.34	...	.34	...	.34
Oleate, precip, bbls ....lb.	...	.20	...	.20	...	.20
Oxide, black, bbls, wks lb.	...	.18	.18	.18¾	.15	.18¾
red 100 lb bbls ......lb.	...	.19½	.19½	.20	.15¾	.20
Sub-acetate verdigris, 400 lb bbls ....lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	...	4.75	4.45	4.75	4.10	4.75
Copperas crys and sugar bulk c-l, wks ....ton	18.00	20.00	14.00	20.00	14.00	16.00
Corn Sugar,tanners,bbls 100 lb.	...	3.36	2.99	3.36	2.89	3.19
Corn Syrup, 42°, bbls 100 lb.	...	3.47	3.02	3.47	2.92	3.17
43°, bbls ....100 lb.	...	3.52	3.07	3.52	2.97	3.22
Cotton, Soluble, wet, 100 lb bbls ....lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, powd & gran 300 lb bbls ....lb.	...	.34½	.28¼	.34½	.22¼	.25¾
Creosote, USP 42 lb cbys lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1 tks ......gal.	.13½	.14	.13½	.14	.13½	.14
Grade 2 ....gal.	.122	.132	.122	.132	.122	.132
Cresol, USP, drs ....lb.	.09¾	.10¼	.09¾	.10¼	.09½	.10½
Crotonaldehyde, 97%, 55 and 110 gal drs, wks .....lb.	.11	.12	.11	.12	.11	.22*
Cutch, Philippine,100 lb bale lb.	...	.04½	.04	.04½	.04	.04½
Cyanamid, pulv, bags, c-l, frt all'd, nitrogen basis, unit	...	1.40	...	1.40	...	1.27½

D

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Derris root 5% rotenone, bbls ....lb.	.24	.30	.24	.30	.24	.30
Dextrin, corn, 140 lb bgs f.o.b., Chicago ...100 lb.	...	3.80	3.40	3.80	3.30	3.75
British Gum, bgs ...100 lb.	...	4.05	3.65	4.05	3.55	3.95
Potato, Yellow, 220 lb bgs lb.	...	.07¾	...	.07¾	.07	.08¾
White, 220 lb bgs, lcl lb.	.08½	.09	.08½	.09	.08	.09
Tapioca, 200 bgs, lcl ...lb.	...	.0715	...	.0715	...	.0715
White, 140 lb bgs...100 lb.	...	3.75	3.35	3.75	3.25	3.70
Diamylamine, c-l, drs, wks lb.	...	.47	...	.47	...	.47
lcl drs, wks ....lb.	...	.48	...	.50	...	.50
tks, wks ....lb.	...	.45	...	.45	...	.45
Diamylene, drs, wks .....lb.	.095	.102	.095	.102	.095	.102
tks, wks ....lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs ...lb.	.085	.092	.085	.092	.085	.092
tks, wks ....lb.	...	.075	...	.075	...	.075
Oxalate, lcl, drs, wks..lb.	...	.30	...	.30	...	.30
Diamylphthalate, drs, wks lb.	.21	.21½	.21	.21½	.19	.21
Diamyl Sulfide, drs, wks lb.	...	1.10	...	1.10	...	1.10
Diatomaceous Earth, see Kieselguhr.						
Dibutoxy Ethyl Phthalate, drs, wks ....lb.	...	.35	...	.35	...	.35
Dibutylamine, lcl, drs, wks lb.	.51	.53	.51	.53	.53	.55
c-l drs, wks ....lb.	...	.50	...	.50	...	...
tks, wks ....lb.	...	.48	...	.48	...	...
Dibutyl Ether, drs, wks, lcl lb.	.24½	.25	.24½	.25	.24½	.25
Dibutylphthalate, drs, wks, frt all'd ....lb.	.19	.19½	.19	.19½	.19	.19½
Dibutyltartrate, 50 gal drs lb.	...	.50	...	.50	.45	.54
Dichlorethylene, drs ......lb.	...	.25	...	.25	...	.25
Dichloroethylether, 50 gal drs, wks ....lb.	.15	.16	.15	.16	.15	.16
tks, wks ....lb.	...	.14	...	.14	...	.14
Dichloromethane, drs, wks lb.	...	.23	...	.23	...	.23
Dichloropentanes, drs, wks lb.	...	.025	...	.025	no prices	
tks, wks ....lb.	...	.0221	...	.0221	no prices	
Diethanolamine, tks, wks..lb.	...	.22½	...	.22½	.22½	.23
Diethylamine, 400 lb drs, lcl, f.o.b., wks ....lb.	...	.70	...	.70	.70	3.00
Diethylaniline, 850 lb drs lb.	.40	.52	.40	.52	.40	.52
Diethyl Carbinol, drs ...lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	...	.25	...	.25	.31¾	.35
Diethylorthotoluidin, drs ..lb.	.64	.67	.64	.67	.64	.67
Diethylphthalate, 1000 lb drs lb.	.19	.19½	.19	.19½	.19	.19½
Diethylsulfate, tech, drs, wks, lcl ....lb.	.13	.14	.13	.14	.13	.14
Diethyleneglycol, drs ....lb.	.14½	.15½	.14½	.15½	.14½	.17
Mono ethyl ethers, drs..lb.	.14½	.15½	.14½	.16	.15	.16
tks, wks ....lb.	...	.13½	...	.13½	.13½	.14
Mono butyl ether, drs..lb.	.22½	.24½	.22½	.24½	.23	.24
tks, wks ....lb.	...	.22	...	.22	...	.22
Diethylene oxide, 50 gal drs, wks ....lb.	.20	.24	.20	.24	.20	.24
Diglycol Laurate, bbls....lb.	...	.16	.16	.21	.15	.23
Oleate, bbls ....lb.	...	.17	.13	.17	.13	.20
Stearate, bbls ....lb.	...	.22	.22	.26	.20	.28
Dimethylamine, 400 lb drs. pure 25 & 40% sol 100% basis ....lb.	...	1.00	...	1.00	...	1.00
Dimethylaniline, 340 lb drs lb.	.23	.24	.23	.24	.23	.24
Dimethyl Ethyl Carbinol, drs lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt all'd ....lb.	...	.18½	...	.18½	...	.19
Dimethylsulfate, 100 lb drs lb.	.45	.50	.45	.50	.45	.50

k Higher price is for purified material; * These prices were on a delivered basis.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Dinitrobenzene, 400 lb bbls lb. *k*	...	.18	.18	.19	.16	.19
Dinitrochlorobenzene, 400 lb bbls ....lb.	...	.14	...	.14	.13½	.14
Dinitronaphthalene, 350 lb bbls ....lb.	.35	.38	.35	.38	.35	.38
Dinitrophenol, 350 lb bbls lb.	...	.22	.22	.23	.22	.24
Dinitrotoluene, 300 lb bbls lb.	...	.15½	...	.15½	...	.15½
Diphenyl, bbls ....lb.	.15	.20	.15	.20	.15	.25
Diphenylamine ....lb.	...	.25	.25	.32	.32	.32
Diphenylguanidine, 100 lb drs ....lb.	.35	.37	.35	.37	.31	.37
Dip Oil, see Tar Acid Oil.						
Divi Divi pods, bgs shipmt ton	...	nom.	...	nom.	...	nom.
Extract ....lb.	.05¾	.06¾	.05¾	.06¾	.05¾	.06¾
Drymet (see sodium metasilicate anhydrous).						
E						
Egg Yolk, dom., 200 lb cases lb.	.58	.60	.57	.62	.59	.69
Epsom Salt, tech, 300 lb bbls c-l, NY ....100 lb.	...	1.90	1.90	2.10	1.90	2.10
USP, c-l, bbls ....100 lb.	...	2.10	...	2.10	...	2.10
Ether, USP anaesthesia 55 lb drs ....lb.	...	.26	...	.26	.22	.23
Isopropyl 50 gal drs ...lb.	.07	.08	.07	.08	.07	.08
tks, frt all'd ....lb.	...	.06	...	.06	...	.06
Nitrous conc bottles ...lb.	...	.68	...	.68	...	.68
Synthetic, wks, drs ...lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt all'd' ....lb.	...	.06	.06	.06½	.051	.061
drs, frt all'd ....lb.	...	.07	.07	.08½	.061	.08
99%, tks, frt all'd ..lb.	...	.06¼	.06¼	.08	.0585	.0685
drs, frt all'd ....lb.	...	.07¼	.07¼	.08¾	.0685	.0785
Acetoacetate, 110 gal drs lb.	...	.27½	...	.27½	...	.27½
Benzylaniline, 300 lb drs lb.	.86	.88	.86	.88	.86	.88
Bromide, tech drs ....lb.	.50	.55	.50	.55	.50	.55
Cellulose, drs, wks, frt all'd ....lb.	.45	.50	.45	.50	.45	.50
Chloride, 200 lb drs ....lb.	.18	.20	.18	.20	.22	.24
Chlorocarbonate, cbys ..lb.	...	.30	...	.30	...	.30
Crotonate, drs ....lb.	...	35	...	.35	.35	.75
Formate, drs, frt all'd ..lb.	.25	.26	.23	.24	.27	.28
Lactate, drs, wks ....lb.	...	.33½	...	.33½	...	.33½
Oxalate, drs, wks ....lb.	...	.25	...	.25	.30	.34
Oxybutyrate, 50 gal drs, wks ....lb.	1.00	nom.	.30	1.00	.30	.30½
Silicate, drs, wks ....lb.	...	.77	...	.77	...	.77
Ethylene Dibromide, 60 lb drs ....lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont ....lb.	.75	.85	.75	.85	.75	.85
Anhydrous ....lb.	...	.75	...	.75	...	.75
Dichloride, 50 gal drs, wks lb.	.0595	.0694	.0595	.0694	.0545	.0994
Glycol, 50 gal drs, wks ..lb.	.14½	.18½	.14½	.18½	.14½	.21
tks, wks ....lb.	...	.13½	...	.13½	.13½	.16
Mono Butyl Ether, drs, wks ....lb.	.16½	.17½	.16½	.21	.16½	.22
tks, wks ....lb.	...	.15½	...	.15½	.15½	.19
Mono Ethyl Ether, drs, wks ....lb.	.14½	.15½	.14½	.15½	.14½	.17
tks, wks ....lb.	...	.13½	...	.13½	.13½	.15
Mono Ethyl Ether Acetate, drs, wks ....lb.	.11½	.12½	.11½	.13	.11½	.14
tks, wks ....lb.	...	.10½	...	.10½	.10½	.13
Mono Methyl Ether, drs wks ....lb.	.15½	.16½	.15½	.17	.16	.22
tks, wks ....lb.	...	.14½	...	.14½	.14½	.17
Oxide, cyl ....lb.	.50	.55	.50	.55	.50	.55
Ethylideneaniline ....lb.	45	.47½	.45	.47½	.45	.47½
F						
Feldspar, blk pottery ...ton	17.00	19.00	17.00	19.00	17.00	19.00
Powd, blk wks ....ton	14.00	17.50	14.00	17.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls ....lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys ....lb.	.06½	.07	.06¼	.07	.06¼	.06½
Fish Scrap, dried, unground wks ....unit *l*	...	3.15	3.10	4.25	3.00	4.25
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis .... unit *m*	...	2.25	2.25	3.50	2.35	3.00
Fluorspar, 98% bgs ....lb.	...	32.60	...	32.60	30.00	33.00
Formaldehyde, USP, 400 lb bbls, wks ....lb.	.055	.06	.05¾	.06¼	.05¾	.06¼
Fossil Flour ....lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines ton	...	15.00	...	15.00	10.00	11.00
Imp powd, c-l, bgs ....ton	no prices		...	25.00	23.00	30.00
Furfural (tech) drs, wks lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs ....lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.16	.17¼	.16	.17¼	.12½	.17¼
Fustic, crystals, 100 lb boxes ....lb.	.24	.25	.24	.28	.22	.28
Liquid 50°, 600 lb bbls lb.	.10½	.14	.10½	.14	.09½	.14
Solid, 50 lb boxes ....lb.	.19	.21	.19	.21	.17½	.21
G						
G Salt paste, 360 lb bbls ..lb.	...	.45	.45	.47	.45	.47
Gambier, com 200 lb bgs lb.	...	.06	...	.07	.06¾	.07¾
Singapore cubes, 150 lb bgs ....100 lb.	...	.08¼	.09	.10	.08	.10
Gelatine, tech, 100 lb cs ..lb.	.42	.43	.42	.43	.42	.50
Glauber's Salt, tech, c-l, bgs, wks* ....100 lb.	.95	1.18	.95	1.18	.95	1.18
Anhydrous, see Sodium Sulfate						

l + 10; *m* + 50; * Bbls. are 20c higher.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Glue, bone, com grades, c-l bgs ....lb.	.13½	.15	.13½	.15½	.13½	.15½
Better grades, c-l, bgs lb.	.15	.23	.15	.23	.11½	.15½
Glycerin, CP, 550 lb drs lb.	...	.12½	...	.12½	...	.12½
Dynamite, 100 lb drs ...lb.	...	nom.	...	nom.	...	.09
Saponification, drs .....lb.	...	.13	...	.13	.08½	.10
Soap Lye, drs ....lb.	.09½	.10½	.09½	.13	.08½	.10
Glyceryl Bori-Borate, bbls lb.	.07⅛	.07⅜	.07⅛	.08¼	.07½	.07⅞
Monoricinoleate, bbls ...lb.	...	.27	...	.27	...	.27
Monostearate, bbls .....lb.	...	.30	...	.30	...	.30
Oleate, bbls ....lb.	...	.22	...	.22	...	.22
Phthalate ....lb.	...	.38	.37	.38	...	.37
Glyceryl Stearate, bbls ...lb.	...	.18	...	.18	.24	.27½
Glycol Bori-Borate, bbls..lbs.	...	.22	...	.22	.22	.23
Phthalate, drs ....lb.	...	.38	...	.38	.38	.40
Stearate, drs ....lb.	...	.26	...	.26	...	.26
GUMS						
Gum Aloes, Barbadoes ...lb.	.80	.85	.80	.90	.85	.90
Arabic, amber sorts ...lb.	.14	.15	.08½	.15	.09	.24
White sorts, No. 1, bgs lb.	.35	.36	.28	.36	.23	.35
No. 2, bgs ....lb.	no prices		.27	.34	.21	.34
Powd, bbls ....lb.	.18	.20	.12½	.20	.12½	.27
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b. NY ....lb.	.04½	.05½	.02½	.10½	.02½	.10½
California, f.o.b. NY, drs ton	29.00	36.50	29.00	36.50	29.00	55.00
Egyptian, 200 lb cases, f.o.b. NY ....lb.	.12	.15	.12	.15	.12	.15
Benzoin Sumatra, USP, 120 lb cases ....lb.	.21	.22	.17	.24	.17	.34
Copal, Congo, 112 lb bgs, clean, opaque ....lb.	...	.29½	.	.29½	.18¼	.29½
Dark amber ....lb.	...	.12⅜	.11⅜	.12⅜	.07⅛	.11⅜
Light amber ....lb.	...	.17	...	.17	.11¼	.17
Copal, East India, 180 lb bgs						
Macassar pale bold ....lb.	...	.12¾	.12¾	.15⅝	.11⅜	.15¼
Chips ....lb.	...	.06¾	.06¾	.09	.05⅜	.08½
Dust ....lb.	...	.05¼	.04¾	.06¾	.03¼	.07⅛
Nubs ....lb.	...	.10½	.10½	.14⅜	.09½	.13¾
Singapore, Bold ....lb.	...	.15¾	.14⅝	.17½	.14	.18¼
Chips ....lb.	...	.08½	.08½	.09⅛	.05⅝	.10¼
Dust ....lb.	...	.05¼	.04¾	.06¾	.03¼	.07⅛
Nubs ....lb.	...	.11	.11	.13½	.09⅝	.14⅜
Copal Manila, 180-190 lb	...	.13⅞	.13¾	.16¾	.09¾	.14½
Loba B ....lb.	...	.11¾	.11¾	.16⅛	.09	.14⅛
Loba C ....lb.	...	.11¼	.11¼	.14½	.07⅞	.12½
DBB ....lb.	...	.10	.06⅞	.12⅛	.05⅛	.08½
MA sorts ....lb.	...	.07¾	.07¾	.13¾	.05⅞	.11
Copal Pontianak, 224 lb cases, bold genuine ..lb.	...	.15⅜	.15⅛	.18½	.15¼	.18½
Chips ....lb.	...	.10	.08⅜	.10½	.07⅛	.11½
Mixed ....lb.	...	.14⅜	.14⅛	.16⅝	.13⅜	.16⅝
Nubs ....lb.	...	.12¾	.10¾	.13½	.10½	.14⅜
Split ....lb.	...	.13¾	.13½	.16⅛	.12	.16⅛
Damar Batavia, 136 lb cases						
A ....lb.	...	.21⅝	.21⅝	.22¾	.20	.23¾
B ....lb.	...	.20¼	.20⅛	.21⅛	.18½	.21⅛
C ....lb.	...	.14⅝	.15⅝	.15¼	.13½	.15⅝
D ....lb.	...	.13¼	.13¼	.13¾	.12¼	.14¼
A/D ....lb.	...	.15¼	.13⅞	.14½	.12¾	.15¼
A/E ....lb.	...	.12⅞	.12⅞	.13⅜	.11⅜	.13¾
E ....lb.	...	.10	.10	.10⅜	.07⅜	.10
F ....lb.	...	.08	.08	.08¾	.07¼	.08¾
Singapore, No. 1 ......lb.	...	.16⅝	.16⅝	.19⅝	.13¼	.19½
No. 2 ....lb.	...	.12¼	.12¼	.15¾	.10½	.16⅜
No. 3 ....lb.	...	.07⅛	.07⅛	.09	.05¼	.09⅛
Chips ....lb.	...	.11	.11	.12½	.09¼	.12½
Dust ....lb.	...	.07⅛	.07⅛	.09	.05¼	.09⅛
Seeds ....lb.	...	.09⅞	.09⅞	.10½	.07⅜	.10½
Elemi, cns, c-l ....lb.	...	.08½	.10⅛	.11⅝	.08⅛	.12⅝
Ester ....lb.	.06¼	.06¾	.06¼	.06¾	.06	.07
Gamboge, pipe, cases ....lb.	.75	.80	.70	.75	.55	.80
Powd, bbls ....lb.	.80	.85	.75	.80	.60	.85
Ghatti, sol, bgs ....lb.	.11	.15	.11	.15	.11	.15
Karaya, bbls, bxs, drs ...lb.	.14	.33	.14	.33	.14	.33
Kauri, NY						
Brown XXX, cases ....lb.	...	.60	...	60	.60	.60½
BX ....lb.	...	.38	...	.38	...	.38
B1 ....lb.	...	.28	...	.28	...	.28
B2 ....lb.	...	.24	...	.24	...	.24
B3 ....lb.	...	.18½	...	.18½	...	.18½
Pale XXX ....lb.	...	.61	...	.61	...	.61
No. 1 ....lb.	...	.41	...	.41	...	.41
No. 2 ....lb.	...	.24	...	.24	...	.24
No. 3 ....lb.	...	.17¾	...	.17¾	...	.17¾
Kino, tins ....lb.	4.00	4.50	4.00	4.50	2.50	4.50
Mastic ....lb.	1.50	2.00	.85	1.25	.55	.90
Sandarac, prime quality, 200 lb bgs & 300 lb cks...lb.	.37	.38	.35	.37	.15	.37
Senegal, picked bags .....lb.	...	.30	...	.30	.25	.30
Sorts ....lb.	...	.13	...	.13	.09¼	.13
Thus, bbls ....280 lbs.	15.00	15.25	15.00	15.25	13.50	15.25
Tragacanth, No. 1, cases..lb.	...	3.50	2.65	3.50	2.25	2.50
No. 2 ....lb.	...	3.35	2.55	3.35	1.90	2.40
No. 3 ....lb.	...	2.90	2.45	2.90	1.60	2.25
Yacca, bgs ....lb.	.03½	.04	.03½	.04	.03½	.08
H						
Helium, cyl (200 cu. ft.) cyl.	...	25.00	...	25.00	...	25.00
Hematine crystals, 400 lb bbls lb.	.20	.30	.20	.30	.20	.34
Hemlock, 25%, 600 lb bbls.						
wks ....lb.	...	.03⅛	.03⅛	.03⅜	.03	.03⅜
tks ....lb.	...	.02¾	.02¾	.03	.02⅝	.02¾
Hexalene, 50 gal drs, wks lb.	...	.30	...	.80	...	.30

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Hexane, normal 60-70° C. Group 3, tks .... gal.	...	.10½	...	.10½	...	.10½
Hexamethylenetetramine, powd, drs .... lb.	.32	.33	.32	.33	.32	.36
Hexyl Acetate, secondary, delv, drs .... lb.	.13	.13½	.13	.13½	.13	.13½
tks .... lb.	...	.12	...	.12	...	.12
Hoof Meal, f.o.b. Chicago unit	2.25	2.40	2.50	3.15	2.50	3.25
Hydrogen Peroxide, 100 vol, 140 lb cbys .... lb.	...	.20	...	.20	.19½	.20
Hydroxylamine Hydrochloride .... lb.	...	3.15	...	3.15	...	3.15
Hypernic, 51°, 600 lb bbls lb.	...	.14	...	.14	.13	.21
I					
Indigo, Bengal, bbls ..... lb.	1.63	1.67	1.63	1.67	...	2.40
Synthetic, liquid ...... lb.	.16½	.19	.16½	.19	.16½	.19
Iodine, Resublimed, jars .. lb.	...	2.15	2.25	2.50	1.75	2.00
Irish Moss, ord, bales ... lb.	.22	.25	.15	.16	.10	.10
Bleached, prime, bales .. lb.	.30	.32	.28	.32	.19	.20
Iron Acetate Liq. 17°, bbls delv .... lb.	.03	.04	.03	.04	.03	.04
Chloride see Ferric Chloride.					
Nitrate, coml, bbls .. 100 lb.	2.75	3.00	2.75	3.00	2.32	3.11
Isobutyl Carbinol (128-132° C) drs, frt all'd .... lb.	...	.22½	.22½	.34	.33	.34
tks, frt all'd .... lb.	...	.21½	.21½	.32	...	.32
Isopropyl Acetate, tks, frt all'd .... lb.	...	.06	.05½	.06	.051	.06
drs, frt all'd .... lb.	.07	.07½	.06½	.07½	.061	.07
Ether, see Ether, isopropyl.					
Keiselguhr, dom bags, c-l, Pacific Coast .... ton	22.00	35.00	22.00	35.00	22.00	35.00
L					
Lead Acetate, f.o.b. NY, bbls, White, broken .... lb.	...	.11	...	.11	.10	.11
cryst, bbls .... lb.	...	.11	...	.11	.10	.11
gran, bbls .... lb.	...	.11¾	...	.11¾	.10¾	.11¾
powd, bbls .... lb.	...	.11¾	...	.11¾	.10¾	.11¾
Arsenate, East, drs ... lb.	...	.08½	.08½	.11	.10	.11½
Linoleate, solid, bbls ... lb.	...	.19	...	.19	...	.19
Metal, c-l, NY ..... 100 lb.	5.00	5.05	4.90	5.25	4.75	5.55
Nitrate, 500 lb bbls, wks lb.	.11	.14	.11	.14	.10	.12
Oleate, bbls .... lb.	.18½	.20	.18½	.20	.18½	.20
Red, dry, 95% Pb_3O_4, delv .... lb.	...	.07¾	.07½	.08	.07¼	.08½
97% Pb_3O_4, delv ... lb.	...	.08	.0765	.08¼	.07½	.0835
98% Pb_3O_4, delv ... lb.	...	.08¼	.08	.08¾	.07¾	.0860
Resinate, precip, bbls .. lb.	...	.16½	...	.16½	...	.16½
Stearate, bbls .... lb.	...	.25	...	.26	.22	.25
Titanate, bbls, c-l, f.o.b. wks, frt all'd .... lb.	.10	.10½	.10	.10½	.11	.11½
White, 500 lb bbls, wks, lb.	...	.07¼	.07	.07¼	...	.07
Basic sulfate, 500 lb bbls, wks .... lb.	...	.06½	.06¼	.06½	...	.06¼
Lime, chemical quicklime, f.o.b., wks, bulk ... ton	7.00	13.00	7.00	13.00	7.00	8.00
Hydrated, f.o.b. wks .. ton	8.50	16.00	8.50	16.00	8.50	12.00
Lime Salts, see Calcium Salts					
Lime, sulfur, dealers, tks . gal.	...	.07½	.07½	.11½	.08	.11½
drs .... gal.	.10	.14	.11	.16	.11	.16
Linseed Meal, bgs ...... ton	...	23.50	23.50	37.00	34.00	42.00
Litharge, coml, delv, bbls lb.	.06¾	.07¼	.06½	.07¼	.06¼	.071
Lithopone, dom, ordinary, delv, bgs .... lb.	...	.036	...	.036	.03¾	.04⅛
bbls .... lb.	..	.0385	.03¾	.03¾	.04	.04⅜
High strength, bgs ..... lb.	...	.05	...	.05	.05¼	.05⅝
bbls .... lb.	...	.05¼	...	.05¼	.05½	.05⅞
Titanated, bgs .... lb.	...	.05	...	.05	.05¼	.05⅝
bbls .... lb.	...	.05¼	...	.05¼	.05½	.05⅞
Logwood, 51°, 600 lb bbls lb.	.10½	.12½	.10½	.12½	.09½	.12½
Solid, 50 lb boxes .... lb.	.16½	.20½	.16½	.20½	.15	.20½
M					
Madder, Dutch .... lb.	.22	.25	.22	.25	.22	.25
Magnesite, calc, 500 lb bbls ton	60.00	65.00	58.00	66.00	58.00	66.00
Magnesium Carb, tech, 70 lb bgs, wks .... lb.	...	.06¼	...	.06¼	.05¾	.06½
Chloride flake, 375 lb bbls, c-l, wks .... ton	...	32.00	32.00	42.00	39.00	42.00
Fluosilicate, crys, 400 lb bbls, wks .... lb.	.10	.10½	.10	.10½	.10	.10½
Oxide, calc tech, heavy bbls, frt all'd ..... lb.	...	.26	.25	.30	.25	.30
Light bbls above basis lb.	...	.26	.20	.26	.20	.25
USP Heavy, bbls, above basis .... lb.	...	.26	.25	.30	.25	.30
Palmitate, bbls .... lb.	.33	nom.	.33	nom.	.33	nom.
Silicofluoride, bbls .... lb.	.11	.11½	.11	.11½	.09½	.11½
Stearate, bbls .... lb.	.23	.26	.23	.27	.21	.24
Manganese, acetate, drs ... lb.	...	.26½	...	.26½	...	.26½
Borate, 30%, 200 lb bbls lb.	.15	.16	.15	.16	.15	.16
Chlorate, 600 lb cks .... lb.	...	.08½	...	.08½	.07½	.12
Dioxide, tech (peroxide), paper bags, c-l ...... ton	...	62.50	62.50	66.50	47.50	66.50
Hydrate, bbls .... lb.	...	.82	...	.82	...	.32
Linoleate, liq, drs ..... lb.	.18	.19½	.18	.19½	.18	.19¼
solid, precip, bbls .... lb.	...	.19	...	.19	...	.19
Resinate, fused, bbls ... lb.	.08¼	.08½	.08¼	.08½	.08¼	.08½
precip, drs .... lb.	...	.12	...	.12	...	.12
Sulfate, tech, anhyd, 90-95%, 550 lb drs ... lb.	.09½	.09¾	.08	.09¾	.07	.08½
Mangrove, 55%, 400 lb bbls lbs.						.04
Bark, African .... ton	35.00	36.00	30.00	39.50	23.00	35.00

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Mannitol, pure cryst, cs, wks lb.	...	.90	.90	1.00	.95	1.20
commercial grd, 250 lb bbls ....lb.	.38	.45	.38	.50	.42	.57
Marble Flour, blk ......ton	12.00	14.00	12.00	14.00	12.00	14.00
Mercury chloride(Calomel) lb.	...	2.95	2.45	2.95	1.36	2.57
Mercury metal ..76 lb. flasks	173.00	175.00	190.00	228.50	95.00	170.00
Mesityl Oxide, f.o.b. dest., tks ....lb.	...	.15	...	.15	.10½	.15
drs, c-l ....lb.	...	.16	...	.16	.11½	.16
drs, lcl ....lb.	...	.16½	...	.16½	.12	.16½
Meta-nitro-aniline ....lb.	.67	.69	.67	.69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls ....lb.	1.05	1.10	1.05	1.40	1.30	1.55
Meta-phenylene diamine 300 lb bbls ....lb.	...	.65	...	.65	.80	.84
Meta-toluene-diamine 300 lb bbls ....lb.	...	.65	.65	.67	.65	.67
Methanol, denat, grd, drs, c-l frt all'd ....gal.	...	.45	...	.45	.41	.46
tks, frt all'd ....gal.	...	.40	...	.40	.35	.40
Pure, drs, c-l, frt all'd' gal.	...	.35½	.35	.38	...	.38
tks ....gal.	...	.30	.30	.33	...	.33
95%, tks ....gal.	...	.28	.28	.31	...	.31
97%, tks ....gal.	...	.29	.29	.32	...	.32
Methyl Acetate, tech tks, delv ....lb.	.06	.07	.06	.07	.06	.06½
55 gal drs, delv .....lb.	.07	.08	.07	.08	.07	.08
C.P. 97-99%, tks, delv lb.	.09½	10½	.09½	.10½	...	.06¼
55 gal drs, delv .....lb.	.10½	.11½	.10½	.11½	.07¼	.07¼
Acetone, frt all'd, drs gal. *p*	...	.37½	.41	.44	.30	.44
tks, frt all'd .....gal. *p*	...	.32	.35	.39	.25	.35
Synthetic, frt all'd, east of Rocky M., drs ....gal. *p*	...	.36	.36	.44	.38	.41
tks, frt all'd ...gal.	...	.34	.34	.36	...	.31½
West of Rocky M., frt all'd, drs..gal. *p*	...	.48	.42	.48	...	.42
tks, frt all'd...gal. *p*	...	.45½	.35	.45½	...	.35
Anthraquinone ....lb.	...	.83	...	.83	...	.83
Butyl Ketone, tks .....lb.	...	.10½	...	.10½	...	.10½
Cellulose, 100 lb lots, frt all'd ....lb.	...	.70	...	.70	...	...
less than 100 lbs. f.o.b. wks ....lb.	...	.75	...	.75	...	...
Chloride, 90 lb. cyl .....lb.	.32	.40	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd lb.	...	.06	.05½	.06	.05	.05½
50 gal drs, frt all'd' c-l lb	.07	.07½	.06½	.07½	.06	.07
Formate, drs, frt all'd..lb.	...	.89	...	.89	.35	.39
Hexyl, Ketone, pure, drs lb.	...	.60	...	.60	...	.60
Lactate, drs, frt all'd...lb.	...	.80	...	.80	...	.30
Mica, dry grd, bgs, wks..ton	...	30.00	...	30.00	...	30.00
Michler's Ketone, kgs ...lb.	...	2.50	...	2.50	...	2.50
Monoamylamine, c-l, drs, wks lb.	...	.52	...	.52	...	.52
lcl, drs, wks ....lb.	.53	.55	.53	.55	...	...
tks, wks ....lb.	...	.50	...	.50	...	...
Monobutylamine, drs, c-l, wks ....lb.	...	.50	...	.50	.50	.65
lcl, wks ....lb.	.51	.53	.51	.53	...	...
tks, wks ....lb.	...	.48	...	.48	...	...
Monochlorobenzene, see "C"						
Monoethanolamine, tks, wks lb.	...	.23	...	.23	...	.23
Monoethylamine (100% basis) lcl, drs, f.o.b. wks ....lb.	...	.65	...	.65	...	...
Monomethylamine, drs, frt all'd, E Mississippi, c-l lb.	...	.65	...	.65	...	.65
Monomethylparamiosulfate, 100 lb drs ....lb.	3.75	4.00	3.75	4.00	3.75	4.00
Morpholine, drs 55 gal, lcl wks ....lb.	...	.75	...	.75	...	...
Myrobalans 25%, liq bbls lb.	no prices		no prices		.03¼	.04¼
50% Solid, 50 lb boxes lb.	no prices		no prices		.04¼	.05
J1 bgs ....ton	...	40.00	28.50	40.00	24.00	50.00
J2 bgs ....ton	...	34.00	23.00	34.00	19.00	41.00

N

	Current Market	1940 Low	1940 High	1939 Low	1939 High
Naphtha, v.m.&p. (deodorized) see petroleum solvents.					
Naphtha, Solvent, water-whte, tks ....gal.	...	.26	.26	.27	.26	.27
drs, c-l ....gal.	...	.31	.31	.32	.31	.32
Naphthalene, dom, crude bgs. wks ....lb.	2.25	2.50	2.25	2.75	2.25	2.85
imported, cif, bgs ...lb.	no prices		...	3.00	1.50	1.85
Balls, flakes, pks ......lb.	.06¼	.07¾	.06¼	.07¾	.06½	.07½
Balls, ref'd, bbls, wks..lb.	...	.07	.06¾	.07	.05¾	.06¾
Flakes, ref'd, bbls, wks lb.	...	.07	.06¾	.07	.05¾	.06¾
Nickel Carbonate, bbls...lb.	.36	.36½	.36	.36½	.36	.37½
Chloride, bbls ....lb.	.18	.20	.18	.20	.18	.20
Metal ingot ....lb.	.34	.36	.34	.35	...	.35
Oxide, 100 lb kgs, NY lb.	.35	.38	.35	.38	.35	.37
Salt, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.13	.13½
Nicotine, 40%, drs, sulfate, 55 lb drs ....lb.	...	.70	...	.70	.70	.76
Nitre Cake, blk ....ton	...	16.00	...	16.00	...	16.00
Nitrobenzene redistilled, 1000 lb drs, wks ....lb.	.08	.09	.08	.10	.08	.10
tks ....lb.	...	.07	...	.07	.07	.07½
Nitrocellulose, c-l, lcl, wks lb.	.20	.29	.20	.29	.22	.29
Nitrogen Sol. 45½% ammon, f.o.b. Atlantic & Gulf ports, tks, unit ton, N basis	...	1.2158	...	1.2158	...	1.2158
Nitrogenous Mat'l, bags imp unit	no prices		2.20	2.60	2.25	2.85
dom, Eastern wks ...unit	...	2.20	2.20	2.90	2.30	3.00
dom. Western wks ...unit	...	1.75	1.95	2.00	1.90	2.25
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Alleppo, bgs ...lb.	.26	.29	.29	.30	.22	.23

a Country is divided in 4 zones, prices varying by zone; *p* Country is divided into 4 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila., or N. Y.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Oak Bark Extract, 25%, bbls lb.	.03⅛	.03⅜	.03⅛	.03⅜	.03⅛	.03½
tks ... lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ... lb.	...	.15	...	.15	.15	.17
Orange-Mineral, 1100 lb cks NY ... lb.	.10¾	.11¾	.10½	.12	.10¼	.10¾
Orthoaminophenol, 50 lb kgs lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	...	.70	.70	.74	.70	.74
Orthochlorophenol, drs ... lb.	...	.32	...	.32	...	.32
Orthocresol, 30.4°, drs, wks lb.	.16	.16½	.16	.16½	.14½	.17½
Orthodichlorobenzene, 1000 lb drs ... lb.	.06	.07	.06	.07	.06	.07
Orthonitrochlorobenzene, 1200 lb drs, wks ... lb.	.15	.18	.15	.18	.15	.18
Orthonitroparachlorphenol, tins ... lb.	...	.75	...	.75	...	.75
Orthonitrophenol, 350 lb drs ... lb.	.85	.90	.85	.90	.85	.90
Orthonitrotoluene, 1000 lb drs, wks ... lb.	...	.09	...	.09	.08	.10
Orthotoluidine, 350 lb bbls, lcl ... lb.	...	.19	...	.19	.16	.19
Osage Orange, cryst, bbls lb.	...	.21	...	.21	.17	.25
51° liquid ... lb.	...	.10	...	.10	.07	.09
P						
Paraffin, rfd, 200 lb bgs						
122-127° M P ... lb.	.02½	.0235	.02¼	.0675	.03¾	.06¾
128-132° M P ... lb.	.057	.0595	.057	.0705	.04	.0705
133-137° M P ... lb.	.06¼	.06½	.06¼	.0755	.0465	.0755
Para aldehyde, 99%, tech, 110-55 gal drs, wks .. lb.	.10	.11¼	.10	.11¼	.10	.16*
Aminoacetanilid, 100 lb kgs ... lb.	...	.85	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ... lb.	1.25	1.30	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	1.05	...	1.05	...	1.05
Chlorophenol, drs ... lb.	...	.32	...	.32	.30	.45
Dichlorobenzene 200 lb drs, wks ... lb.	.11	.12	.11	.12	.11	.12
Formaldehyde, drs, wks lb.	.23	.24	.34	.35	.34	.35
Nitroacetanilid, 300 lb bbls ... lb.	.45	.52	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wk ... lb.	...	.47	...	.47	.45	.47
Nitrochlorobenzene, 1200 lb drs, wks ... lb.	...	.15	.15	.16	.15	.16
Nitro-orthotoluidine, 300 lb bbls ... lb.	2.75	2.85	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	...	.35	.35	.37	.35	.37
Nitrosodimethylaniline, 120 lb bbls ... lb.	.92	.94	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	...	.30	...	.30	.30	.35
Phenylenediamine, 350 lb bbls ... lb.	1.25	1.30	1.25	1.30	1.25	1.30
Toluenesulfonamide, 175 lb bbls ... lb.	...	.70	.70	.75	.70	.75
tks, wks ... lb.	...	.31	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ... lb.	.20	.22	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ... lb.	...	.48	.48	.50	.48	.58
Paris Green, dealers, drs lb.	.23	.25	.23	.26	.23	.26
Pentane, normal, 28-38° C, group, 3 tks ... gal.	...	.08½	...	.08½	...	.08½
drs, group 3 ... gal.	.11½	.16	.11½	.16	.11½	.16
Perchlorethylene, 100 lb drs, frt all'd ... lb.	.08	.08½	.08	.08¾	.08	.10½
Petrolatum, dark amber, bbls. ... lb.	...	.02¾	.02¾	.05	.02⅝	.05
White, lily, bbls ... lb.	...	.04¾	.04¾	.08½	.05¼	.08½
White, snow, bbls ... lb.	...	.05½	.05½	.09½	.06¼	.09½
Petroleum Ether, 30-60°, group 3, tks ... gal.	...	.13½	...	.13½	.13	.13½
drs, group 3 ... gal.	.14½	.25½	.14½	.25½	.14	.25½
PETROLEUM SOLVENTS AND DILUENTS						
Cleaners naphthas, group 3, tks, wks ... gal.	06⅞	.07	.06⅞	.07	.06⅜	.07
East Coast, tks wks gal.	.09	.10½	.09	.10½	.09	.10
Lacquer diluents, tks, East Coast ... gal.	.09½	.10	.09½	.10	.09	.12½
Group 3, tks ... gal.	.07⅜	.07⅞	.07⅜	.07⅞	.07⅜	.08
Naphtha, V.M.P., East tks, wks ... gal.	.09½	.10	.09½	.10	.09	.10
Group 3, tks, wks ... gal.	...	.06⅞	.06⅜	.07⅞	.06⅜	.07
Petroleum thinner, 43-47, East, tks, wks ... gal.	.08¾	.09½	.08¾	.09½	.08½	.10
Group 3, tks, wks .. gal.	...	.05⅞	.05⅞	.07	.05⅜	.06
Rubber Solvents, stand grd, East, tks, wks .. gal.	...	.09½	.09½	.10	.09	.10
Group 3, tks, wks .. gal.	.06⅞	.07	.06⅜	.07⅞	.06⅜	.07
Stoddard Solvents, East, tks, wks ... gal.	.08¾	.09½	.08¾	.09½	.08½	.10
Group 3, wks ... gal.	.06⅜	.06½	.06⅜	.06½	.05⅞	.06½
Phenol, 250-100 lb drs .. lb.	.13	.14¾	.13	.14¾	.13	.15½
tks, wks ... lb.	...	.12	...	.12	.12	.13½
Phenyl-Alpha-Naphthylamine, 100 lb kgs ... lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs ... lb.	...	.17	...	.17	...	.17
Phenylhydrazine Hydrochloride, com ... lb.	...	1.50	...	1.50	...	1.50
Phloroglucinol, tech, tins lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tons ... lb.	20.00	22.00	20.00	22.00	20.00	22.00

* These prices were on a delivered basis.

Current

Phosphate Rock
Rosins

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Phosphate Rock, f.o.b. mines						
70% basis ....ton	...	2.15	1.85	1.90	...	1.85
72% basis ....ton	...	2.40	2.15	2.35	...	2.35
Florida Pebble, 68% basis ton	...	1.90	1.90	2.85	...	2.85
75-74% basis ......ton	...	2.90	2.90	3.85	...	3.85
Tennessee, 72% basis..ton	...	4.50	...	4.50	...	4.50
Phosphorus Oxychloride 175						
lb cyl ....lb.	.15	.18	.15	.20	.16	.20
Red, 110 lb cases ......lb.	.40	.44	.40	.44	.40	.44
Sesquisulfide, 100 lb cs..lb.	.38	.42	.38	.44	.38	.44
Trichloride, cyl ....lb.	.15	.16	.15	.18	.15	.18
Yellow, 110 lb cs, wks lb.	.18	.20	.18	.20	.24	.30
Phthalic Anhydride, 100 lb						
drs, wks ....lb.	.14½	.15½	.14½	.15½	...	.14½
Pine Oil, 55 gal drs or bbls						
Destructive dist ....lb.	.50	.55	.53	.56	.46	.48
Steam dist wat wh bbls gal.	...	.59	...	.59	...	.59
tks ....gal.		.54	...	.54	...	.54
Pitch Hardwood, wks ...ton	23.75	24.00	23.75	24.00	23.75	24.00
Coaltar, bbl, wks......ton	...	19.00	...	19.00	...	19.00
Burgundy, dom, bbls, wks lb.	.05½	.06½	.05½	.06½	.05½	.06½
Imported ....lb.	no prices		no prices		.15	.16
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls ....bbl.	6.00	6.50	6.00	6.50	6.00	6.25
Platinum, ref'd ....oz.	34.00	36.00	35.00	40.00	32.00	40.00
POTASH						
Potash, Caustic, wks, sol..lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06½
flake ....lb.	.07	.07½	.07	.07½	.07	.07⅜
liquid, tks ....lb.	...	.02⅞	.02⅞	.03¾	...	.02⅞
Manure Salts, imported						
30% basis, blk .....unit	no prices		...	.58½	...	.58½
Potassium Abietate, bbls . lb	...	.08	.08	.09	...	.09
Acetate, tech, bbls, delv lb.	...	.26	...	.26	...	.26
Bicarbonate, USP, 320 lb						
bbls ....lb.	...	.17	...	.18	...	.18
Bichromate Crystals, 725						
lb cks* ....lb.	.08⅞	.09¼	.08¾	.09¼	.08¾	.09¼
Binoxalate, 30 lb bbls ..lb.	...	.23	...	.23	...	.23
Bisulfate, 100 lb kgs ...lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, 80-85% calc 800						
lb cks ....lb.	.06½	.06¾	.06½	.07	.06½	.07
liquid, tks ....lb.	...	.0275	.0275	.03	...	.02⅞
drs, wks ....lb.	.03	.03⅛	.03	.03½	.03	.03½
Chlorate crys, 112 lb kgs,						
wks ....lb.	.10½	.17	.10½	.13	.09¼	.13
gran, kgs ....lb.	.12	.14½	.12	.14½	.12	.14½
powd, kgs ....lb.	.10	.17	.10	.12½	.08½	.12½
Chloride, crys, bbls ...lb.	.04	nom.	.04	.04¾	.04	.04¾
Chromate, kgs ....lb.	.24	.27	.24	.27	.19	.28
Cyanide, 110 lb cases...lb.	no prices		no prices		.50	.55
Iodide, 250 lb bbls .....lb.	...	1.45	...	1.35	1.13	1.35
Metabisulfite, 300 lb bbls lb.	nom.	.15	.13	.15	.11	.18
Muriate, bgs, dom, blk unit	...	.53½	...	.53½	...	.53½
Oxalate, bbls ....lb.	.25	.26	.25	.26	.25	.26
Perchlorate, kgs, wks...lb.	.09½	.11	.09½	.11	.09	.10½
Permanganate, USP, crys,						
500 & 1000 lb drs, wks lb.	.18½	.19	.18½	.19½	.18½	.19½
Prussiate, red, bbls ....lb.	nom.	.45	.38	.45	.30½	.45
Yellow, bbls ....lb.	.17	.19	.15	.16	.14	.16
Sulfate, 90% basis, bgs ton	34.25	36.25	34.25	36.25	36.25	38.00
Titanium Oxalate, 200 lb						
bbls ....lb.	.40	.45	.40	.45	.35	.45
Pot & Mag Sulfate, 48% basis						
bgs ....ton	no prices		...	24.75	24.75	25.75
Propane, group 3, tks ...lb.	.03¾	.04	.03	.04⅜	.03	.04⅜
Putty, com'l, tubs ...100 lb.	...	3.15	...	6.00	3.00	6.00
Linseed Oil, kgs ...100 lb.	...	5.00	...	4.50	...	4.50
Pyrethrum, conc liq:						
2.4% pyrethrins, drs, frt						
all'd ....gal.	...	4.95	4.95	7.50	5.75	7.50
3.6% pyrethrins, drs, frt						
all'd ....gal.	...	7.35	7.35	11.00	8.45	11.00
Flowers, coarse, Japan,						
bgs ....lb.	.23	.24	.23	.36	.26	.36
Fine powd, bbls .....lb.	.25	.26	.25	.37	.27	.37
Pyridine, denat, 50 gal drs gal.	...	1.71	...	1.71	1.63	1.71
Refined, drs ....lb.	...	.51	...	.51	.50	.51
Pyrites, Spanish cif Atlantic						
ports, blk ....unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.15	2.40	2.15	2.40	2.15	2.75
Q						
Quebracho, 35% liq tks ..lb.	...	.03½	.03¼	.03½	.02⅞	.03⅜
450 lb bbls, c-l ......lb.	...	.04	...	.04	.04	.04⅛
Solid, 63%, 100 lb bales						
cif ....lb.	...	.04½	...	.04½	.04	.04½
Clarified, 64% bales .lb.	...	.04¾	...	.04¾	.04¼	.04¾
Quercitron, 51 deg liq, 450 lb						
bbls ....lb.	.08½	.09½	.08½	.09½	.07½	.08½
Solid, drs ....lb.	.11	.16½	.10	.16½	.10	.12
R						
R Salt, 250 lb bbls, wks lb.	...	.55	...	.55	...	.55
Resorcinol, tech, cans ...lb.	.68	.74	.75	.80	.75	.80
Rochelle Salt, cryst .....lb.	.25¾	.26¼	.22¼	.23¼	.17¾	.21¾
Powd, bbls ....lb.	.24¾	.25¼	.21¾	.22¼	.16¾	.20¼
Rosin Oil, bbls, first run gal.	.45	.50	...	.50	.45	.47
Second run ....gal.	.51	.56	.52	.56	.47	.49
Third run, drs ....gal.	.52	.57	.56	.57	.51	.53
Rosins 600 lb bbls, 100 lb unit ex. yard NY:***						
B	2.18	2.22	1.80	2.22	4.60	5.45
D	...	2.10	1.87	2.10	4.95	5.70
E	...	2.20	1.95	2.20	5.20	6.40
F	2.22	2.25	2.10	2.38	5.50	6.75
G	...	2.22	2.10	2.42	5.75	7.00
H	...	2.22	2.10	2.42	5.75	7.10
I	...	2.22	2.10	2.42	5.77½	7.20

* Spot prices are ⅛c higher; *** Sept. 30—1939, high and low based on 280 lb. unit.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Rosins (continued)						
K	...	2.22	2.12	2.42	5.80	7.20
M		2.21	2.20	2.46	5.90	7.25
N	2.20	2.45	2.39	2.62	6.75	7.40
WG	...	2.80	2.68	2.90	6.95	7.70
WW	...	3.17	3.00	3.17	7.45	8.50
Rosins, Gum, Savannah (280 lb unit):**						
B	...	1.35	1.15	1.35	3.25	4.00
D		1.45	1.22	1.45	3.55	4.30
E	1.53	1.55	1.30	1.55	3.80	5.00
F	1.57	1.60	1.45	1.73	4.00	5.35
G	...	1.57	1.45	1.79	4.40	5.70
H	...	1.57	1.45	1.79	4.40	5.70
I	...	1.57	1.45	1.79	4.40	5.80
K	...	1.57	1.47	1.79	4.40	5.80
M	1.55	1.56	1.55	1.83	4.40	5.85
N	...	1.70	1.70	1.99	5.10	6.00
WG	...	2.15	2.03	2.28	5.60	6.30
WW	...	2.52	2.25	2.52	6.05	7.10
X	...	2.52	2.35	2.52	5.60	7.10
Rosin, Wood, c-l, FF grade, NY	...	1.40	1.40	1.44	5.35	6.80
Rotten Stone, bgs mines ton	25.50	37.50	25.50	37.50	22.50	37.50
Imported, lump, bbls...lb.	no prices		...	.14	...	.14
Powdered, bbls ......lb.	no prices		.08½	.10	.08½	.10
S						
Sago Flour, 150 lb bgs..lb.	.03½	.04	.04	.04½	.02½	.04½
Sal Soda, bbls wks...100 lb.	...	1.20	...	1.20	...	1.20
Salt Cake, 94-96%, c-l, bulk wks ....ton	...	17.00	...	17.00	19.00	25.00
Chrome, c-l, wks ......ton	...	16.00	11.00	16.00	11.00	12.00
Saltpetre, gran, 450-500 lb bbls ....lb.	...	.071	...	.071	.06½	.069
Cryst, bbls ....lb.	...	.081	...	.081	.07½	.0865
Powd, bbls ....lb.	..	.081		.081	.07½	.079
Satin, White, pulp, 550 lb bbls ....lb.	.01¼	.01½	.01¼	.01½	.01¼	.01½
Schaeffer's Salt, kgs ....lb.	...	.46	.46	.48	.46	.48
Shellac, Bone dry, bbls..lb. r	.25	.26	.25	.26	.18	.26
Garnet, bgs ....lb.	...	.19½	.19	.23	.12½	.20
Superfine bgs ....lb. t	.13½	.17	.14½	.20½	.10	.21
T. N., bgs ....lb. t	.13½	.16½	.13½	.19½	.09½	.20
Silver Nitrate, vials .....oz.	...	.26⅞	.26⅞	.27⅜	.26⅞	.33½
Slate Flour, bgs, wks....ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks ....100 lb.	...	1.10	...	1.10	...	1.10
58% light, bgs .....100 lb.	1.05	1.08	1.05	1.08	...	1.08
blk ....100 lb.	...	.90	...	.90	...	.90
paper bgs ....100 lb.	...	1.05	...	1.05	...	1.05
bbls ....100 lbs.	...	1.35	...	1.35	...	1.35
Caustic, 76% grnd & flake, drs ....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drs.....100 lb.	...	2.30	...	2.30	2.10	2.30
Liquid sellers, tks...100 lb.	...	1.95	1.95	1.97½	...	1.97½
Sodium Abietate, drs ....lb.	...	.11	...	.11	...	.11
Acetate, 60% tech, gran, powd, flake, 450 lb bbls wks ....lb.	.04	.05	.04	.05	.04	.05
90%, bbls, 275 lb delv lb.	.06	.06¾	.06	.06¾	...	...
anhyd, drs, delv .....lb.	.08¼	.10	.08¼	.10	.08¼	.10
Alginate, drs ....lb.	.39	.70	.39	.96	.70	.95
Antimoniate, bbls .....lb.	.14½	.15	.14½	.15	.11½	.16
Arsenate, drs ....lb.	.07	.08¾	.07	.08¾	.08	.08½
Arsenite, liq, drs ....gal.		.35		.35	.30	.35
Dry, gray, drs, wks..lb.	.06½	.09¼	.06½	.09½	.07½	.09½
Benzoate, USP kgs ...lb.	.46	.50	.46	.52	.46	.48
Bicarb, powd, 400 lb bbl, wks ....100 lb.	...	1.70	1.70	1.85	...	1.85
Bichromate, 500 lb cks, wks* ....lb.	.06⅞	.07¼	.06¾	.07¼	.06¾	.07¼
Bisulfite, 500 lb bbls, wks lb.	.03	.031	.03	.031	.031	.036
35-40% sol bbls, wks 100 lb.	1.30	1.80	1.40	1.80	1.40	1.80
Chlorate, bgs, wks .....lb.	...	.06¼	.06¼	.08½	.06¼	.07½
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.14	.15	.14	.15	.14	.15
Diacetate, 33-35% acid, bbls, lcl, delv ....lb.	...	.09	.08½	.09	...	.09
Fluoride, white 90%, 300 lb bbls, wks ....lb.	.07	.08	.07	.08	.07	.08¾
Hydrosulfite, 200 lb bbls, f.o.b. wks ....lb.	.16	.17	.16	.17	.16	.17
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	...	2.80	2.80	3.05	...	2.80
Tech, reg cryst, 375 lb bbls, wks ....100 lb.	2.45	...	2.45	2.80	2.45	2.80
Iodide, jars ....lb.	...	2.42	2.30	2.42	...	2.30
Metanilate, 150 lb bbls..lb.	.41	nom.	.41	.42	.41	.42
Metasilicate, gran, c-l, wks ....100 lb.	...	2.35	...	2.35	2.20	2.35
cryst, drs, c-l, wks 100 lb.	...	3.05	...	3.05	2.90	3.05
Anhydrous, wks, cl, drs ....100 lb.	3.75	3.75	3.75	3.75	3.75	3.75
wks, lcl, drs, ...100 lb.	5.05	5.05	5.05	5.05	5.05	5.05
Monohydrated, bbls ...lb.	...	.023	...	.023	...	.023
Naphthenate, drs ......lb.	.12	.19	.12	.19	.12	.19
Naphthionate, 300 lb bbl lb.	...	.50	...	.50	.50	.54
Nitrate, 92% crude, 200 lb bgs, c-l, NY ....ton	...	28.30	...	28.30	...	28.30
100 bgs, same basis .ton	...	29.00	...	29.00	...	29.00
Bulk ....ton	...	27.00	...	27.00	...	27.00
Nitrite, 500 lb bbls ....lb.	.06¾	.11½	.06¾	.11½	.06¾	.11½
Othochlorotoluene, sulfonate, 175 lb bbls, wks lb.	.25	.27	.25	.27	.25	.27
Orthosilicate, 300 lb drs, c-l ....lb.	...	.03	...	.03	...	.03
Perborate, drs, 400 lb ..lb.	.14¾	.15¾	.14¾	.15¾	.14¾	.15¼

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case: t T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c: Philadelphia f.o.b. N. Y. *Spot price is ⅛c higher. ** Sept. 27—1939, high and low based on 280 lb. unit.

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Sodium (continued):						
Peroxide, bbls, 400 lb ..lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.30	...	2.30	2.05	2.30
bgs, wks ......100 lb.	...	2.10	...	2.10	1.85	2.10
Tri-sodium, tech, 325 lb. bbls, wks ......100 lb.	...	2.45	...	2.45	2.20	2.45
bgs, wks ......100 lb.	...	2.25	...	2.25	2.00	2.25
Picramate, 160 lb kgs..lb.	...	.65	.65	.67	.65	.67
Prussiate, Yellow, 350 lb. bbls, wks ....lb.	.09½	.09¾	.09½	.09¾	.09½	.10¾
Pyrophosphate, anhyd, 100 lb bbls f.o.b. wks frt eq lb.	...	.0530	...	.0530	...	.0530
Sesquisilicate, drs, c-l, wks ....100 lb.	...	2.90	...	2.90	2.80	2.90
Silicate, 60°, 55 gal drs, wks ....100 lb.	1.40	1.80	1.40	1.80	1.65	1.70
40°, 55 gal drs, wks 100 lb	...	.80	...	.80	...	.80
tks, wks ......100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY ....lb.	no prices		no prices		.03½	.04¾
Stannate, 100 lb drs ...lb.	no prices		.31½	.34½	.30	.35
Stearate, bbls ....lb.	.19	.24	.19	.24	.19	.24
Sulfanilate, 400 lb bbls lb.	.16	.18	.16	.18	.16	.18
Sulfate, Anhyd, 550 lb bgs c-l, wks ....100 lb. ‡	1.45	1.65	1.45	1.90	1.45	1.90
Sulfide, 80% cryst, 440 lb. bbls, wks ....lb.	.02¼	.03	.02¼	.03	.02¼	.02½
Solid, 650 lb drs, c-l, wks ....lb.	.03	.03¾	.03	.03¾	.03	.03½
Sulfite, powd, 400 lb bbls wks ....lb.	...	.05¼	.023	.05¼	.023	.02½
Sulfocyanide, drs ......lb.	.28	.47	.28	.47	.28	.47
Sulforicinoleate, bbls....lb.	...	.12	...	.12	...	.12
Supersilicate (see sodium sesquisilicate)						
Tungstate, tech, crys, kgs lb.	no prices		no prices		1.05	1.10
Sorbitol, com, solut, wks c-l, drs, wks ....lb.	...	.14¾	.14¾	.16	...	.15½
Spruce, Extract, ord, tks..lb.	...	.01⅛	...	.01⅛	...	.01⅛
Ordinary, bbls .....lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, tks...lb.	...	.01⅜	...	.01⅜	...	.01⅜
Super spruce ext, bbls..lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext. powd, bgs ....lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs 100 lb.	...	2.95	2.50	2.95	2.40	2.85
Powd, 140 lb bgs ...100 lb.	...	3.05	2.60	3.05	2.50	2.90
Potato, 200 lb bgs .....lb.	.05	.06	.05	.07½	.04	.06¾
Imp, bgs ....lb.	no prices		...	.06½	.05	.06½
Rice, 200 lb bbls ......lb.	.07½	.08½	.07¼	.08½	.06¼	.07¼
Sweet Potato, 240 lb bbls, f.o.b. plant ......100 lb.	nom.	6.75	5.50	6.75	5.50	7.50
Wheat, thick, bgs .....lb.	...	.05	.05¼	.05½	.05	.05½
Strontium, carbonate, 600 lb bbls, wks ....lb.	no prices		.22	.23	.16	.24
Nitrate, 600 lb bbls, NY lb.	.07¾	.08¾	.07¾	.08¾	.07¾	.08¼
Sucrose, octa-acetate, den, grd, bbls, wks ......lb.	...	.45	...	.45	...	.45
tech, bbls, wks ....lb.	...	.40	...	.40	...	.40
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	...	16.00
Flour, com'l, bgs ...100 lb.	1.60	1.95	1.60	2.35	1.65	2.35
bbls ....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs..100 lb.	...	2.00	2.00	2.80	2.20	2.80
bbls ....100 lb.	...	2.35	2.35	3.15	2.55	3.15
Extra fine, bgs .....100 lb.	...	2.35	2.85	3.00	2.85	3.00
Superfine, bgs .....100 lb.	2.65	2.80	2.65	2.80	2.65	2.80
bbls ....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs ......100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls ....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs ....100 lb.	...	2.35	2.35	3.10	2.35	3.10
bbls ....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, 700 lb drs, wks ....lb.	.03	.08	.03	.08	.03	.04
Sulfur Dioxide, 150 lb cyl lb.	.07	.09	.07	.09	.07	.09
Multiple units, wks ....lb.	.04½	.07	.04½	.07	.04½	.07
tks, wks ....lb.	.04	.06	.04	.06	.04	.05
Refrigeration, cyl, wks lb.	.16	.40	.16	.40	.16	.17
Multiple units, wks ...lb.	.07½	.10	.07½	.10	.07½	.10
Sulfuryl Chloride ....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd .....ton	no prices		98.00	140.00	65.50	85.00
Extract, 42°, bbls .....lb.	.06	.06¼	.06	.06¼	.05¼	.06¼
Superphosphate, 16% bulk, wks ....ton	...	8.50	8.50	9.00	8.00	9.00
Run of pile ....ton	...	8.00	8.00	8.50	7.50	8.50
Triple, 40-48%, a.p.a. bulk, wks, Balt. unit .....ton	...	.68	.68	.70	..	.70
T						
Talc, Crude, 100 lb bgs, NY ton	14.00	16.00	14.00	15.00	13.00	15.00
Ref'd 100 lb bgs, NY ton	15.25	17.25	14.00	17.25	14.00	16.00
French, 220 lb bgs, NY ton	no prices		23.00	35.00	23.00	30.00
Ref'd, white bgs, NY ton	no prices		45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	no prices		64.00	70.00	60.00	70.00
Ref'd', white bgs, NY ton	no prices		65.00	78.00	65.00	70.00
Tankage, Grd, NY ...unit §	...	2.50	2.35	3.25	2.75	3.25
Ungrd ....unit §	...	2.50	2.35	3.25	2.75	5.00
Fert grade, f.o.b. Chgo unit §	...	2.50	2.20	3.50	2.50	4.50
South American cif unit §	...	2.60	2.50	3.50	3.00	4.00
Tapioca Flour, high grade, bgs ....lb.	.03	.05	.02¾	.05	.01¾	.05½
Tar Acid Oil, 15%, drs..gal.	.22	.24	.22	.24	.21	.24
25% drs ....gal.	.25	.27	.25	.28	.25	.28
Tar, pine, delv, drs......gal.	.26	.27	.26	.27	.25	.27
tks, delv, E. cities ....gal.	...	.21	...	.21	.20	.21
Tartar Emetic, tech, bbls lb.	.34¾	nom.	.34¾	.35	.27¾	.35
USP, bbls ....lb.	.40	nom.	...	.40	.33	.40
Terpineol, den grade, drs lb.		.17		.17		.17
Tetrachlorethane, 650 lb drs lb.	.08	.08½	.08	.08½	.08	.08½
Tetrachlorethylene, drs, tech lb.	.08	.09	.08	.09½	.	.09½
Tetralene 50 gal drs, wks lb.	...	.18	.12	.18	.12	.13
Thiocarbanilid, 170 lb bbls lb.	...	.24	.20	.25	.20	.25

‡ Bags 15c lower; § + 10.

Prices

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Tin, crystals, 500 lb bbls, wks lb.	.38½	.39	.36	.40½	.35½	.39
Metal, NY lb.	* ...	.51¾	.45½	.55	.45½	.60
Oxide, 300 lb bbls, wks lb.	.54	.56	.51	.56	.50	.54
Tetrachloride, 100 lb drs, wks lb.	...	.24¾	.23	.26½	.23	.32
Titanium Dioxide, 300 lb bbls lb.	.13¼	.14	.13	.16	.13¼	.16
Barium Pigment, bbls lb.	.05¼	.06½	.05¼	.06½	.05⅝	.06½
Calcium Pigment, bbls lb.	.05¼	.06¼	.05	.06¼	.05⅜	.06½
Titanium tetrachloride, drs. f.o.b. Niagara Falls lb.	.32	.45	.32	45	.32	.45
Titanium trichloride 23% sol. bbls f.o.b. Niagara Falls lb.	.22	.26	.22	.26	.22	.26
20% solution, bbls lb.	.175	.215	.175	.215	.175	.215
Toluidine, mixed, 900 lb drs, wks lb.	...	.26	.26	.27	.26	.27
Toluol, 110 gal drs, wks gal.	...	.32	.27	.32	...	.27
8000 gal tks, frt all'd gal.	...	.27	.22	.27	...	.22
Toner Lithol, red, bbls lb.	.55	.60	.55	.60	.55	.80
Para, red, bbls lb.	.70	.75	.70	.75	.70	.80
Toluidine, bgs lb.	...	1.05	1.05	1.35	...	1.35
Triacetin, 50 gal drs, wks, lb.	...	.26	...	.26	...	.26
Triamyl Borate, lcl, drs, wks lb.	...	.27	...	.27	...	.27
Triamylamine, c-l, drs, wks lb.	...	.77	...	.77	.77	1.25
lcl, wks, drs lb.	.78	.80	.78	.80	...	...
tks, wks lb.	...	.75	...	.75	...	...
Tributylamine, lcl, drs, wks lb.	...	.67	.67	.70	...	.70
c-l, drs, wks lb.	...	.66	.66	.67	...	...
tks, wks lb.	...	.65	...	.65	...	...
Tributyl citrate, drs, frt all'd lb.	.24	.26	.24	.35	.35	.45
Tributyl Phosphate, frt all'd lb.	...	.42	...	.42	...	.42
Trichlorethylene, 600 lb drs, frt all'd E. Rocky Mts lb.	.08	.09	.08	.09	.08	.09½
Tricresyl phosphate, tech, drs, lb.	.22	.36½	.22	.36½	.22	.37½
Triethanolamine, 50 gal drs wks lb.	...	.19	.19	.22	.21	.22
tks, wks lb.	...	.18	.18	.20	...	.20
Triethylamine, lcl, drs, f.o.b. wks lb.	...	1.05	...	1.05	...	...
Triethylene glycol, drs, wks lb.	...	.26	...	.26	...	.26
Trihydroxyethylamine Oleate, bbls lb.	...	.30	...	.30	...	.30
Stearate bbls lb.	...	.30	...	.30	...	.30
Trimethyl Phosphate, drs, lcl, f.o.b. dest lb.	...	.50	...	.50	...	.50
Trimethylamine, c-l, drs, frt all'd E. Mississippi lb.	...	1.00	...	1.00	...	1.00
Triphenylguanidine, lb.	.58	.60	.58	.60	.58	.60
Triphenyl Phosphate, drs lb.	...	.38	...	.38	...	.38
Tripoli, airfloated, bgs, wks ton	...	26.00	26.00	30.00	26.00	30.00
Turpentine (Spirits), c-l, NY dock, bbls gal.	...	.36¾*	.32½	.40	.29	.35
Savannah, bbls gal.	...	.24¾*	.26½	.34	.23½	.29
Jacksonville, bbls gal.	no prices		.26	.34¾	.23½	.26¾
Wood Steam dist, drs, c-l, NY gal.	...	.31*	.27	.34½	.242	.34
Wood, dest dist, l-c-l, drs, delv E. cities gal.	...	.34*	.23	.32	.22	.25
U						
Urea, pure 112 lb cases lb.	...	.12	.12	.15½	.14½	.15½
Fert grade, bgs, c. i. f. S.A. points ton	no prices		...	110.00	95.00	110.00
Dom f.o.b., wks ton	...	85.00	85.00	101.00	95.00	101.00
Urea Ammonia, liq., nitrogen basis ton	...	121.50	...	121.50	...	...
V						
Valonia beard, 42%, tannin bgs ton	...	56.00	47.00	56.00	45.00	57.00
Cups, 32% tannin bgs ton	42.00	44.00	33.00	39.00	27.00	39.00
Extract, powd, 63% lb.	.0565	nom.	.0565	.06	.05	.06
Vanillin, ex eugenol, 25 lb tins, 2000 lb lots lb.	...	2.60	...	2.60	2.20	2.60
Ex-guaiacol lb.	...	2.50	...	2.50	2.10	2.50
Ex-lignin lb.	...	2.50	...	2.50	2.10	2.50
Vermilion, English, kgs lb.	no prices		...	2.76	1.50	2.97
W						
Wattle Bark, bgs ton	37.50	39.50	34.00	38.75	34.50	40.00
Extract, 60°, tks, bbls lb.	...	.03⅞	.03⅞	.04¼	.04	.05½
Wax, Bayberry, bgs lb.	.22	.23	.25	.30	.16⅞	.39
Bees, bleached, white 500 lb slabs, cases lb.	...	.35	.35	.38	.33	.40½
Yellow, African, bgs lb.	.24½	.25	.23	.28	.18½	.30
Brazilian, bgs lb.	.25½	.26	.24	.29	.21	.33
Refined, 500 lb slabs, cases lb.	.29	.31	.29	.36	.25½	.36
Candelilla, bgs lb.	.18½	.19	.18	.19	.15¼	.19
Carnauba, No. 1, yellow, bgs lb.	.71	.72	.58	.85	.36¾	.78
No. 2, yellow, bgs lb.	.70	.71	.57	.84	.35¾	.45
No. 2, N. C., bgs lb.	.61	.62	.46	.73	.34	.41
No. 3, Chalky, bgs lb.	.57	.58	.43	.66	.27½	.46
No. 3, N. C., bgs lb.	.57	.58	.47	.68	.28¾	.49
Ceresin, dom, bgs lb.	.11	.11½	.11½	.15	.08½	.15
Japan, 224 lb cases lb.	.15	.15½	.15½	.16½	.09¾	.18
Montan, crude, bgs lb.	no prices		no prices		.11	.11¾
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.22	.23	.22	.25	.18	.25
Cakes, cases lb.	.23	.24	.23	.25	.19	.26
Whiting, chalk, com 200 lb bgs, c-l, wks ton	16.00	20.00	12.00	20.00	12.00	14.00
Gilders, bgs, c-l, wks ton	...	18.00	15.00	18.50	...	15.00
Wood Flour, c-l, bgs ton	24.00	25.00	20.00	30.00	20.00	30.00
Xylol, frt all'd, East 10° tks, wks gal.	...	.29	...	.30	.29	.30
Com'l tks, wks, frt all'd, gal	...	.26	...	.27	.26	.27
Xylidine, mixed crude, drs lb.	.35	.36	.35	.36	.35	.36
Zein, bgs, 1000 lb lots, wks lb.	...	.20	...	.20	...	...

* Sept. 28. ‡ May 31.

Current

Zinc Acetate
Oil, Whale

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Zinc Acetate, tech, bbls, lcl, delv ... lb.	.15	.16	.15	.16	.15	.21
Arsenite, bgs, frt all'd ... lb.	..	.12	.12	.12½	.12	.13
Carbonate tech, bbls, NY lb.	.14	.16	.14	.16	.14	.15
Chloride fused, 600 lb drs, wks ... lb.	...	.04¼	.04¼	.046	.04¼	.046
Gran, 500 lb drs, wks lb.	...	.05	.05	.05¾	.05	.05¾
Soln 50%, tks, wks 100 lb.	...	2.25	...	2.25	...	2.25
Cyanide, 100 lb drs ... lb.	...	.33	...	.33	...	.33
Dust, 500 lb bbls, c-l, delv lb.	...	.09¼	.07½	.08½	.06½	.08½
Metal, high grade slabs, c-l, NY ... 100 lb.	...	7.64	5.90	7.64	4.84	6.40
E. St. Louis ... 100 lb.	...	7.25	4.60	7.25	4.60	6.00
Oxide, Amer, bgs, wks lb.	...	.06½	.06¼	.07½	.06¼	.07½
French 300 lb bbls, wks lb.	...	.08	.06¼	.07¾	.06½	.07¾
Palmitate, bbls ... lb.	.24½	.27½	.23	.27½	.23	.25
Resinate, fused, pale bbls lb.	...	.10	...	.10	...	.10
Stearate, 50 lb bbls ... lb.	...	.22	.21½	.24½	.20	.24½
Sulfate, crys, 400 lb. bbls wks ... lb.	...	.029	.0275	.029	...	.029
Flake, bbls ... lb.	...	.0325	...	.0325	...	.0325
Sulfide, 500 lb bbls, delv lb.	...	.07¾	.07¾	.08	.07¾	.08⅞
bgs, delv ... lb.	...	.07½	.07½	.07¾	.07½	.08⅝
Sulfocarbolate, 100 lb kgs lb.	.24	.29	.24	.26	.24	.26
Zirconium Oxide, crude, 70-75% grd, bbls, wks ton	75.00	100.00	75.00	100.00	75.00	100.00

Oils and Fats

	Current Market		1940 Low	1940 High	1939 Low	1939 High
Babassu, tks, futures ... lb.	nom.	.05¾	.05¾	.06⅝	.05⅞	.07⅝
Castor, No. 3, 400 lb drs lb.	nom.	.10¾	.10¾	.12¾	.08¼	.12¾
Blown, 400 lb drs ... lb.	nom.	.12¾	.12¾	.14¾	.10¼	.14¾
China Wood, drs, spot NY lb.	...	.26¼	.22½	.28	.15	.28
Tks, spot NY ... lb.	...	.25¼	.21½	.27	.14½	.27
Coconut, edible, drs NY ... lb.	...	.07½	.07½	.09⅜	.08⅛	.10⅛
Manila, tks, NY ... lb.	...	.02¾	.02¾	.03⅜	.02⅞	.04⅝
Tks, Pacific Coast ... lb.	.02⅝	.02¾	.02¾	.03½	.02⅝	.04⅜
Cod, Newfoundland, 50 gal bbls ... gal.	...	.60	.60	.72	.29	.72
Copra, bgs, NY ... lb.	.0185	.0190	.0165	.0190	.0160	.2625
Corn, crude, tks, mills ... lb.	.05¼	.05⅜	.05⅛	.06½	.05⅛	.07⅛
Refd, 375 lb bbls, NY lb.	...	.07⅞	.07⅞	.09	.07½	.09¾
Degras, American, 50 gal bbls NY ... lb.	.08	.08½	.08	.10	.07	.10
Greases, Yellow ... lb.	nom.	.03⅜	.03	.05¼	.03⅞	.06¾
White, choice, bbls, NY lb.	nom.	.03⅞	.03⅜	.05⅝	.04½	.07½
Lard, Oil, edible, prime ... lb.	...	.08½	.08	.10	.09	.11¼
Extra, bbls ... lb.	...	.07½	.06¾	.09⅜	.08	.10⅜
Extra, No. 1, bbls ... lb.	...	.07¼	.06⅞	.08⅞	.07¾	.10⅛
Linseed, Raw less than 5 bbl lots ... lb.	...	.09	.09	.116	.092	.119
bbls, c-l, spot ... lb.	...	.084	.084	1.10	.084	.111
Tks ... lb.	...	.078	.078	.104	.078	.104
Menhaden, tks, Baltimore gal.	.21	nom.	.21	.35	.21	.35
Refined, alkali, drs ... lb.	...	.067	.067	.079	.062	.082
Tks ... lb.	...	.061	.061	.071	.056	.076
Kettle boiled, drs ... lb.	...	.079	.079	.093	.074	.094
Light pressed, drs ... lb.	...	.061	.061	.075	.056	.076
Tks ... lb.	...	.055	.055	.069	.067	.069
Neatsfoot, CT, 20°, bbls, NY lb.	...	.15¼	.15¼	.19¼	.14¾	.19¾
Extra, bbls, NY ... lb.	...	.07½	.06⅞	.09	.08	.10⅛
Pure, bbls, NY ... lb.	...	.10½	.10¼	.14¼	.10¾	.16¾
Oiticica, bbls ... lb.	.18½	.19½	.17	.21	.09¼	.21
Oleo, No. 1, bbls, NY ... lb.	...	.07⅜	.07⅜	.07¾	.07¼	.12
No. 2, bbls, NY ... lb.	...	.07⅛	.07	.07½	.06¾	.11¾
Olive, denat, bbls, NY ... gal.	nom.	1.80	.94	1.80	.82	1.40
Edible, bbls, NY ... gal.	...	2.75	1.85	2.75	1.75	2.25
Foots, bbls, NY ... lb.	...	.09¼	.08	.09¼	.06¾	.10
Palm, Kernel, bulk ... lb.	no prices		no prices		.034	.036
Niger, cks ... lb.	nom.	.03¼	.03¼	.05½	.03⅝	.05½
Sumatra, tks ... lb.	...	.02¼	.02¼	.03	.0265	.02¾
Peanut, crude, bbls, NY lb.	...	.09	.06¾	.09	.06	.08
Tks, f.o.b. mill ... lb.	nom.	.05¼	.05⅛	.07⅛	.05¼	.07¼
Refined, bbls, NY ... lb.	...	.08⅜	.08¼	.09¾	.08¾	.10¾
Perilla, drs, NY ... lb.	...	.18	.19	.21	.09½	.16½
Tks, Coast ... lb.	...	.17	.18½	.20	.089	.15¾
Pine, see Pine Oil, Chem. Sec.						
Rapeseed, blown, bbls, NY lb.	nom.	.17½	.17	.17½	.14	.17½
Denatured, drs, NY ... gal.	1.10	1.15	1.00	1.05	.80	1.05
Red, Distilled, bbls ... lb.	.06¼	.07¼	.06¼	.09½	.06¾	.09½
Tks ... lb.	...	.05¾	.05¾	.08	.064	.08½
Sardine, Pac Coast, tks ... gal.	.25	nom.	.37	.39	.24	.38
Refined alkali, drs ... lb.	...	.067	.067	.081	.062	.082
Tks ... lb.	...	.061	.061	.075	.056	.076
Light pressed, drs ... lb.	...	.061	.061	.075	.056	.076
Tks ... lb.	...	.055	.055	.069	.05	.07
Sesame, white, dom ... lb.	.16	nom.	.11½	.11¾	.09	.12
Soy Bean, crude						
Dom, tks, f.o.b. mills ... lb.	...	.04¾	.04¾	.06¼	.04½	.06½
Crude, drs, NY ... lb.	...	.05¾	.05¾	.07¾	.05⅛	.07⅝
Ref'd, drs, NY ... lb.	...	.07¼	.07¼	.08½	.06⅜	.09
Tks ... lb.	...	.06¼	.06¼	.07⅝	.05¾	.07¾
Sperm, 38° CT, bleached bbls, NY ... lb.	...	.11	.105	.11	.09	.103
45° CT, blchd, bbls, NY ... lb.	...	.103	.098	.103	.083	.096
Stearic Acid, double pressed dist bgs ... lb.	...	.10	.09¾	.13	.10	.13½
Double pressed saponified bgs ... lb.	...	.10¼	.10	.13¾	.10¼	.13¾
Triple pressed dist bgs lb.	...	.12¾	.12½	.16½	.12¾	.16½
Stearine, Oleo, bbls ... lb.	nom.	.05¼	.05¼	.06½	.05½	.12
Tallow City, extra loose ... lb.	nom.	.03¾	.03⅜	.05⅜	.04⅜	.07
Edible, tierces ... lb.	nom.	.04¾	.04⅜	.05¾	.04½	.07¾
Acidless, tks, NY ... lb.	...	.06¼	.06¼	.08	.07	.09¼
Turkey Red, single, drs ... lb.	...	.08	.082	.09	.06	.08⅝
Double, bbls ... lb.	...	.10½	.11	.12¾	.08¾	.11¼
Whale:						
Winter bleach, bbls, NY lb.	...	095	...	.095	.075	.095
Refined, nat, bbls, NY ... lb.	...	.091	...	.091	.071	.091

PROFESSIONAL DIRECTORY

Industry's Bookshelf

Teaching of Chemical Engineering, Published by American Institute of Chemical Engineers, New York, 384 pages, $2.50. Here is something—something for men in industry, the engineering teaching profession and students. This volume contains the papers presented at the meeting and Second Summer School for Chemical Engineering Teachers held under the auspices of the Society for the promotion of Engineering Education and its Chemical Engineering Division at Pennsylvania State College, June 20-30, 1939. The papers presented at these meetings deal with, primarily from the instructional viewpoint, the majority of subjects pertinent to the chemical engineering curriculum. They will be found to cover both lecture and laboratory aspects of the chemical engineering unit operations and unit processes, as well as such topics as chemical engineering thermodynamics, chemical engineering economics, chemical technology, plant design, instrumentation, service courses, and teacher qualifications and development. This book should not only prove of great and immediate interest and help to teachers and students of chemical engineering but also to men in the industry. This should be so not only because of the ideas and knowledge to be gained from the technical discussions but because it will give men interested in the chemical industry information and understanding of what is being done to train suitable candidates for responsible positions. It will indicate the qualifications possessed by young chemical engineers and the trend for engineering education in the future. It should stimulate on the part of industry comment and expressions of opinion on the methods and subject matter for the training of young men for important positions in an increasingly important industry.

Whale Oil, an Economic Analysis by Karl Brandt, Food Research Institute, Stanford University Press, 264 pages, $3.00. Here is a comprehensive work on an industry which has had a long and romantic history. The book opens with a discussion of the place held by whale oil as a raw material among the fats. From there on the discussion is divided into three parts, namely, whaling, whale oil, and the outlook for whaling and whale oil. In the second part or discussion on whale oil there is a full treatment of such subjects as whale oil supplies, whaling costs and profits, demand for whale oil, transport, storage and marketing of whale oil, tariff duties, excise taxes and other protective measures, and the price structure of whale oil. The book is interestingly written and brings out a number of interesting facts about this largest of all earth creatures, such as the fact that one blue whale is equal in weight to twenty-five elephants, and that the rate of growth during the first year averages 10 pounds per hour or one ton in a little more than eight days.

Modern Cosmeticology, by Ralph G. Harry, Chemical Publishing Co., New York, 288 pages, $5.00. This volume on the principles and practices of modern cosmetics deals comprehensively with the scientific and therapeutic side of a growing industry. The development of research and application of various organic synthetics and intermediates has resulted in some drastic changes in composition and formulation of some cosmetic products during the past few years. The author attempts to bring these developments up-to-date in one volume. He has included references to original papers of medical and scientific nature and these may prove of value to the reader.

Handbook of Mathematical Tables and Formulas, by Richard Stevens Burington, Ph.D., Handbook Publishers, Inc., Sandusky, Ohio, 275 pages. This book of formulas, theorems, tables and some explanatory matter from elementary algebra to calculus will prove of value to those who have occasion to use or review mathematics.

Fundamentals of Semimicro Qualitive Analysis, by Erwin B. Kelsey and Harold G. Dietrich; The Macmillan Co., New York; 350 pages, $2.75. Recognizing a definite trend toward the use of semimicro methods in analysis the authors here present the result of their study and experience of the subject. The first portion of the book discusses the nature and structure of substances, properties of solutions, equilibrium, and principles of oxidation-reduction. In the second part the semimicro technique and apparatus is described along with procedures for analyses.

The Physical Sciences, by E. M. Cable, and R. W. Getchell, and W. H. Kadesch; Prentice-Hall, Inc., New York; 754 pages, to trade $5.00, to school $3.75. The aim of this book is to help the reader interpret intelligently the forces that make up a complex world and place at his disposal enough knowledge to free the mind of prejudice and superstition. In general a mixture of elementary physics, chemistry and astronomy.

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Index to Advertisers

Index to Advertisers

"We"—Editorially Speaking

Most unique innovation at American Chemical Society meetings in many years was a nursery at Detroit where members could leave their children while they attended the scientific sessions. Sorry, but we could not get pictures of Dr. Parsons and Dr. Howe "interviewing" the "future" chemists of the nation. Perhaps Dr. Howe was thinking in terms of that cream-colored suit.

"Dave" Killeffer's biggest thrill at the meeting was escorting a Jesuit priest into the Masonic Temple for one of the technical meetings. And what a lesson in tolerance and the American way of life to see twelve nuns in attendance at the Leibig Symposium held in the Temple.

Only complaint we heard was about the rather long walk to and from the Temple from the downtown hotels. Some of the taxi drivers "beefed" copiously about being "Two-bits'd" to death.

After hearing Dr. Harrison E. (Here's) Howe conduct the "Professor Quiz" hour at the "Chemists' Carnival" at the A. C. S. meeting, we concluded the national networks are missing a bet. H. V. (Church) Churchill, chief chemist, Aluminum Corporation of America, Gustav (Gus) Egloff, director of research, Universal Oil Products, Frank C. (Rocky) Whitmore, Penn State, and Hobart H. (Hobe) Willard, University of Michigan, did right well as "Professor Quiz's" stooges until the affair went commercial. The question as to what are the regular containers for mercury, Epsom salt, bromine, picric acid, picramic acid, etc. as printed in the News Edition of *Industrial & Engineering Chemistry*, proved to be a puzzler. A purchasing agent or a chemical peddler was badly needed at that crucial moment.

As usual the paint and rubber dinners were outstanding events of the meeting. Remember "No Johnny, No Johnny?"

The Detroit newspapers failed to give the chemists as much space as they received in Cincinnati last spring. But who are the chemists of the nation to expect to compete in news value with the Chevrolet dealers, the Dodge dealers and a possible American League pennant winner?

Since writing the last we have been informed by our ten-year-old that Detroit is officially "in" as pennant winner.

We are quite sure that Detroit as excellent host to the A. C. S. did not subscribe to the implication of the sign "Welcome Dodge Men."

After the chemists and chemical engineers of the nation get through filling out the several questionnaires they are about to receive, they will hardly feel that they can be accused of any "dodging."

Wonder how soon some fertile-brained song writer will favor us with "I Raised My Boy To Be a Captain."

"Chemistry in Warfare," by Frederick A. Hessel, Mary S. Hessel and Wellford Martin, is a very interesting and timely contribution in view of the seriousness of the international situation. Foreword is by Crosby Field, Colonel, Ordnance Department Reserve, U. S. Army. Despite the rather lurid titles of some of the chapters, (Man-Made Man Killers, Crucibles of Death, etc.), the book is definitely not of the "sensational" type. We wish to particularly compliment the authors on their clear interpretation of chemistry's part in modern warfare. Certainly the chemist is not to be taken to task because others have prostituted his inventions and discoveries to kill rather than to save mankind. Hastings House, New York, is the publisher.

This is a cordial invitation to visit with us at our exhibit on "New Chemicals for Industry" at the National Chemical Exposition, sponsored by the Chicago Section of the American Chemical Society, to be held in the Hotel Stevens, Chicago, December 11-15. More of the details in our Special November Show Issue.

Fifteen Years Ago

From Our Files of October, 1925

Elias A. Johnson, manager of New York branch of Monsanto Chemical Works, elected president of Salesmen's Association of the American Chemical Industry.

More than 12,000 technical and business representatives of the chemical industries register at the Tenth Exposition of Chemical Industries in New York.

The long-pending chemical merger of German companies manufacturing dyes, nitrogen, pharmaceuticals and photographic chemicals, and artificial silk is completed.

Sales for Grasselli Dyestuff Corp. taken over by General Dyestuff Corp.

The Paint Manufacturers' Association of the United States elect J. Sibley Felton as president.

Dry Color Manufacturers' Association organized with Arthur S. Somers as president.

A sharp break in ammonia prices is brought about by introduction of synthetic ammonia.

State of Chemical Trade

Current Statistics (Sept. 30, 1940)—p. 66

WEEKLY STATISTICS OF BUSINESS

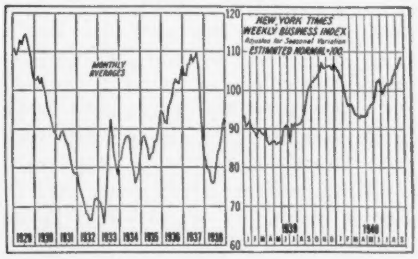
Week Ending	Carloadings 1940	Carloadings 1939	Carloadings % of Change	Electrical Output* 1940	Electrical Output* 1939	Electrical Output* % of Change	Jour. of Com. Price Index	Nat'l Chem. & Drugs	Fertilizer Fats & Oils	Ass'n Price Indices Fert. Mat.	Ass'n Price Indices Mixed Fert.	Ass'n Price Indices All Groups	†Labor Dept. Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher Commodity Index
Aug. 31......	768,821	716,397	+ 7.3	2,601,127	2,357,203	+10.3	80.2	97.8	44.8	70.1	78.6	75.6	76.5	91.3	105.3	81.6
Sept. 7......	695,258	662,357	+ 5.0	2,462,622	2,289,960	+ 7.5	80.3	97.8	45.6	70.5	78.6	75.9	76.8	82.5	106.1	82.0
Sept. 14......	804,309	800,431	+15.7	2,638,634	2,444,371	+ 7.9	79.1	97.8	44.1	70.3	78.6	75.3	76.8	91.9	107.2	81.8
Sept. 21......	813,329	809,752	+ 0.4	2,628,667	2,448,888	+ 7.3	78.9	97.8	44.1	70.4	78.6	75.1	76.8	92.9	108.5	81.9

* K.W.H. 000 omitted. † 1926-1928 = 100.00.

MONTHLY STATISTICS

CHEMICAL:	Aug. 1940	Aug. 1939	July 1940	July 1939	June 1940	June 1939
Acid, sulfuric (expressed as 50° Baumé, short tons, Bureau of the Census)						
Total prod. by fert. mfrs.	......	......	......	139,248	176,846	140,580
Consumpt. in mfr. fert.	......	......	......	104,378	137,321	106,137
Stocks end of month	......	......	......	79,786	90,971	80,394
Alcohol, Industrial (Bureau Internal Revenue)						
Ethyl alcohol prod., proof gal..	24,094,279	18,539,035	22,457,040	17,643,960	21,422,578	16,837,615
Comp. denat. prod., wine gal ..	1,828,289	580,681	867,244	542,979	510,666	861,139
Removed, wine gal.	1,726,587	481,463	718,795	527,689	469,215	813,449
Stocks end of mo., wine gal...	747,274	767,662	647,139	670,230	498,981	655,996
Spec. denat. prod., wine gal. ..	9,681,922	8,610,026	9,575,329	6,893,795	9,195,587	7,304,710
Removed, wine gal.	9,468,110	8,717,897	8,777,859	6,859,407	9,155,395	7,130,244
Stocks end of mo., wine gal...	2,171,894	1,239,267	1,957,968	1,352,424	1,163,487	1,325,563
Ammonia sulfate prod., tons *a*..	62,254	60,718	60,718	46,666	58,514	42,380
Benzol prod., gal. *b*	11,357,000	11,727,000	11,727,000	8,219,000	11,052,000	7,466,000
Byproduct coke prod., tons *a*...	4,682,073	4,619,156	4,612,091	3,354,100	4,374,626	3,078,500
Cellulose Plastic Products (Bureau of the Census)						
Nitrocellulose sheets, prod., lbs.	610,141	759,235	680,067	697,609	535,266	704,235
Sheets, ship., lbs.	670,897	741,297	679,766	600,701	587,953	703,764
Rods, prod., lbs.	208,565	243,985	156,643	226,630	169,922	188,714
Rods, ship., lbs.	246,200	244,699	210,930	199,282	203,560	240,930
Tubes, prod., lbs.	71,455	65,426	62,413	54,495	64,756	63,772
Tubes, ship., lbs.	52,445	79,332	64,158	46,844	58,538	55,159
Cellulose acetate, sheets, rod, tubes						
Production, lbs.	772,928	1,041,430	564,729	561,018	633,808	446,093
Shipments, lbs.	783,686	814,634	407,830	536,674	562,223	378,046
Molding comp., ship.; lbs. ..	1,341,994	967,367	777,367	604,476	682,095	702,854
Methanol (Bureau of the Census)						
Production, crude, gals.	......	......	......	377,755	425,578	343,992
Production, synthetic, gals.	......	......	......	2,495,394	3,426,100	2,295,288
Pyroxylin-Coated Textiles (Bureau of the Census)						
Light goods, ship., linear yds...	......	......	......	2,259,299	2,236,151	2,361,536
Heavy goods, ship., linear yds...	......	......	......	1,712,002	1,794,124	2,025,048
Pyroxylin spreads, lbs. *c*	......	......	......	4,350,562	3,931,148	4,710,415
Exports (Bureau of Foreign & Dom. Commerce)						
Chemicals and related prod. *d*..	......	$15,000	$22,312	$13,459	$23,286	$12,800
Crude sulfur *d*	......	$1,450	$833	$730	$984	$941
Coal-tar chemicals *d*	......	$1,105	$2,587	$663	$1,840	$1,388
Industrial chemicals *d*	......	$2,391	$5,067	$2,236	$4,303	$2,401
Imports						
Chemicals and related prod. *d*..	......	$11,224	$5,300	$11,500	$3,745	$5,300
Coal-tar chemicals *d*	......	$1,037	$1,598	$1,191	$542	$819
Industrial chemicals *d*	......	$967	$1,033	$1,068	$696	$1,449
Employment (U. S. Dept. of Labor, 3 year av., 1923-25 = 100) Adjusted to 1937 Census Totals						
Chemicals and allied prod., including petroleum	119.4	109.2	118.6	110.5	119.1	109.8
Other than petroleum	118.7	105.9	117.6	107.8	118.1	107.2
Chemicals	141.2	119.1	140.4	117.1	138.3	116.5
Explosives	139.9	93.3	132.7	91.1	126.4	89.7
Payrolls (U. S. Dept. of Labor, 3 year av., 1923-25 = 100) Adjusted to 1937 Census Totals						
Chemicals and allied prod., including petroleum	135.0	119.0	133.5	117.8	133.3	118.7
Other than petroleum	134.2	113.8	132.5	113.6	132.1	113.9
Chemicals	171.0	136.3	168.9	130.8	165.2	131.5
Explosives	172.1	109.1	166.8	102.8	153.7	100.9
Price index chemicals*	84.8	83.8	84.9	83.9	85.1	84.2
Drugs & Pharmaceuticals* ...	96.2	77.1	95.9	77.2	82.2	77.4
Fert. mat.*	68.0	65.5	67.3	65.3	67.4	66.5
Paint and paint mat.	84.2	82.1	84.6	82.2	85.2	82.4
FERTILIZER:						
Exports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ...	......	141,171	122,837	154,800	90.061	136,016
Total phosphate rock	......	98,580	69,469	128,656	47,545	98,917
Total potash fertilizers	......	5,579	13,390	7,870	1,303	16,679
Imports (long tons, Nat. Fert. Association)						
Fertilizer and fert. materials ...	......	75,485	118,116	88,313	98,934	107,640
Sodium nitrate	......	9,481	82,342	18,479	62,598	59,332
Total potash fertilizer	......	29,087	7,441	41,234	10,349	16,425

INDUSTRIAL TRENDS



Business: Industrial and business activity still continues to improve. Most of the general indexes of activity have steadily gained. The New York Times Weekly Business Index has reached its highest point since 1937 and will probably progress further. Carloadings are high. Production of electricity reached new high record during week ended September 28. Another indication of rising activity was the all-time peak in telephone installations which reached 17,181,800 on September 30. The Federal Reserve Board Index rose to 123 for August and will probably be placed at about 127 for September.

Steel: Steel operations have been hovering just a little better than 90% for some time. A new monthly record was set in domestic consumption of iron and steel scrap during August when total was 3,968,000 tons. Operations for the month of August averaged 89.72% of capacity against 83.40% for July and 52.74% for August, 1939.

Electric Output: Production of electricity by the electric light and power industry of the United States reached a new all time high during week ended September 28. The total amounted to 2,669,661,000 kwh, an increase of 8.1% over corresponding period of 1939.

Carloadings: Increased activity in nearly all industrial activity has benefited the railroads in increased loadings of revenue freight. A new high record for the year was reached during the week of September 28 when loadings amounted to 822,434 cars.

Automotive: Output of the automotive industry was in small volume during August owing to seasonal change-over to 1941 model cars. The

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low point was reached early in August. During latter part of that month there was a gradual rise and then a sharp upturn during September to approach the industry's normal capacity rate of about 100,000 units a week. Consumer demand is reflected in very brisk retail sales. Production schedules indicate the best fourth quarter assembly total on record.

Construction: Value of new construction work undertaken in August was at about the same level as in July according to reports of F. W. Dodge Corporation and Federal Reserve System. The volume of contracts for public projects continued unusually large and the amount of new private work was larger than in July. Residential building was at the highest level in recent years, on seasonally adjusted basis, reflecting further increases in both private and public contracts.

Textiles: Textile mill activity continued to increase in August and was at highest level since January. Cotton consumption advanced considerably further and silk deliveries rose from the small volumes of recent months. Activity at wool textile mills increased seasonally, following sharp rise in July, while at rayon mills activity showed a less than seasonal increase but continued at high level.

Commodity Prices: Prices of several industrial materials, including copper, zinc, steel scrap, lumber, hides, and print cloth advanced somewhat from middle of August to middle of September. Foodstuffs were higher owing to seasonal developments. Prices of most other commodities showed little change.

Retail Trade: Retail trade is still gaining in volume. Department store sales for week ended September 21 showed increase of 10% over last year. Sales of the year to September 21 were 5% higher than for same period last year.

Outlook: All indications point to the most active fourth quarter in several years. The increased industrial activity which has been centered on heavy goods industries is increasing purchasing power and should bring about accelerated buying in semi-durable consumer goods and retail trade.

Consumption of steel which is estimated at about 90% of the industry's capacity during September is expected to average about 95% during final quarter. Consequently production should run as close to 95% during the next three months as facilities will allow.

Carloadings and electrical production have already reached peaks and will probably go higher.

MONTHLY STATISTICS (cont'd)

FERTILIZER: (Cont'd)	Aug. 1940	Aug. 1939	July 1940	July 1939	June 1940	June 1939
Superphosphate e (Nat. Fert. Association)						
Production, total	......	231,128	271,877	206,783	272,235	208,634
Shipments, total	......	155,780	158,944	98,565	199,784	106,606
Northern area	......	104,123	101,421	68,462	125,893	73,709
Southern area	......	51,657	57,523	30,103	73,891	32,397
Stocks, end of month, total	......	1,197,822	1,202,304	1,080,976	1,051,092	943,644
Tag Sales (short tons, Nat. Fert. Association)						
Total, 17 states	161,633	154,853	40,300	51,630	149,890	93,813
Total, 12 southern	60,782	42,992	32,829	47,915	122,457	86,180
Total, 5 midwest	100,851	111,861	7,471	3,715	27,433	7,633
Fertilizer employment *i*	81.4	73.9	79.8	73.4	88.4	78.9
Fertilizer payrolls *i*	71.2	62.7	69.7	63.4	78.6	64.9
Value imports, fert. and mat. *d*	......	$1,711	$2,439	$2,240	$2,119	$2,262
GENERAL:						
Acceptances outst'd'g *f*	$181	$235	$188	$236	$206	$244
Coal prod., anthracite, tons	......	3,832,000	4,415,000	2,951,000	4,367,000	3,183,000
Coal prod., bituminous, tons	......	34,688,000	36,080,000	29,391,000	32,340,000	26,101,000
Com. paper outst'd'g *f*	$246	$201	$232	$194	$224	$180
Failures, Dun & Bradstreet	1,128	1,126	1,175	1,153	1,114	1,119
Factory payrolls *i*	103.7	89.7	96.5	84.4	97.9	96.3
Factory employment *i*	103.5	96.3	99.5	93.5	99.7	93.4
Merchandise imports *d*	$220,217	$175,623	$232,258	$168,910	$211,390	$178,866
Merchandise exports *d*	$349,800	$250,102	$317,015	$229,631	$350,458	$325,306
GENERAL MANUFACTURING:						
Automotive production	75,878	99,868	231,703	209,359	344,636	309,738
Boot and shoe prod., pairs	......	43,580,655	33,467,857	34,211,989	27,904,992	32,312,819
Bldg. contracts, Dodge *j*	$414,941	$312,328	$398,673	$299,883	$324,000	$288,316
Newsprint prod., U. S. tons	86,633	80,000	82,579	74,932	84,762	80,562
Newsprint prod., Canada, tons.	316,607	236,975	332,689	227,630	315,343	240,545
Glass containers, gross‡	......	4,753	4,780	3,506	4,428	4,662
Plate glass prod., sq. ft.	......	10,450,000	8,521,800	6,212,200	9,783,139	9,288,800
Window glass prod., boxes	992,906	867,452	993,678	690,418	907,865	720,227
Steel ingot prod., tons	......	3,763,000	5,595,070	3,564,827	5,532,000	3,523,000
% steel capacity	......	61.9	83.40	52.74	84.97	53.71
Pig iron prod., tons	4,238,041	4,053,945	4,053,945	2,639,022	3,818,000	2,372,000
U.S. cons'pt. crude rub., lg. tons	50,477	51,740	47,011	43,880	46,506	48,438
Tire shipments	4,173,508	4,990,486	4,348,281	5,142,832	6,718,761	5,849,008
Tire production	4,621,223	5,510,819	4,853,869	4,595,362	5,127,384	4,975,604
Tire inventories	9,732,108	8,690,984	9,344,956	8,103,365	8,984,994	8,632,494
Cotton consumpt., bales	......	628,448	597,850	521,353	556,529	578,436
Cotton spindles oper.	22,078,162	22,009,882	21,916,700	21,939,404	21,942,748	21,771,316
Silk deliveries, bales	30,189	33,095	22,766	26,134	17,307	26,256
Wool consumption *s*	......	38.9	31.2	30.1	25.7	32.6
Rayon deliv., lbs.	35,400,000	31,300,000	32,700,000	32,900,000	31,400,000	33,000,000
Hosiery (all kinds) *t*	......	9,739,075	9,418,000	7,748,929	9,710,803	8,694,258
Rayon employment *i*	307.7	255.1	306.9	297.0	306.0	286.2
Rayon payrolls *i*	318.0	246.6	314.7	283.2	314.3	271.8
Soap employment *i*	82.9	86.0	81.3	81.9	81.5	79.6
Soap payrolls *i*	101.6	102.3	99.9	99.0	100.4	97.3
Paper and pulp employment *i*	116.7	107.0	117.0	105.8	116.2	106.2
Paper and pulp payrolls *i*	124.9	107.7	126.4	101.2	126.2	104.5
Leather employment *i*	80.2	85.3	80.1	85.5	80.1	84.8
Leather payrolls *i*	77.0	83.1	76.0	82.0	75.7	82.2
Glass employment *i*	108.1	98.5	104.2	96.3	104.9	93.0
Glass payrolls *i*	117.4	102.5	106.2	91.5	111.0	96.0
Rubber prod. employment *i*	85.7	82.6	83.5	78.7	83.6	80.1
Rubber prod. payrolls *i*	90.2	86.3	85.2	81.5	86.4	82.1
Dyeing and fin. employment *i*	121.4	122.2	116.1	119.2	115.7	116.8
Dyeing and fin. payrolls *i*	101.6	103.3	95.0	97.6	93.0	97.1
MISCELLANEOUS:						
Oils & Fats Index (26=100)[1]	......	......	53.4	50.8	53.1	53.7
Gasoline prod. *p*	......	46,899	51,879	51,896	51,325	50,868
Cottonseed oil consumpt., bbls.	......	305,000	258,730	244,827	246,655	256,799
PAINT, VARNISH, LACQUER, FILLERS:						
Sales 680 establishments	......	......	$35,553,580	$30,758,617	$37,897,861	$38,504,857
Trade sales (580 establishments)	......	......	$19,573,840	$17,215,946	$21,718,413	$22,341,180
Industrial sales, total	......	......	$12,732,233	$10,713,443	$12,585,957	$12,585,957
Paint & Varnish, employ. *i*	......	......	124.7	122.2	126.4	124.3
Paint & Varnish, payrolls *i*	......	......	132.7	124.0	136.2	128.9

a Bureau of Mines; *b* Crude and refined plus motor benzol, Bureau of Mines; *c* Based on 1 lb. of gun cotton to 7 lbs. of solvent, making an 8-lb. jelly; *d* 000 omitted, Bureau of Foreign & Domestic Commerce; *e* Expressed in equivalent tons of 16% A.P.A.; *f* 000,000 omitted at end of month; *i* U. S. Dept. of Labor, 3 year average, 1923-25 = 100, adjusted to 1937 census totals; *j* 000 omitted, 37 states; *p* Thousands of barrels, 42 gallons each; *q* 680 establishments, Bureau of the Census; *r* Classified sales, 580 establishments, Bureau of the Census; *s* 53 manufacturers, Bureau of the Census; *t* 387 identical manufacturers, Bureau of the Census, quantity expressed in dozen pairs; *v* In thousands of bbls., Bureau of the Census; ** Indices, Survey of Current Business, U. S. Dept. of Commerce; *z* Units are millions of lbs.; ‡ 000 omitted; * New series beginning March, 1940; [1] Revised series beginning February, 1940.

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U. S. Smelting Refining Earns $3.99 a Share

United States Smelting, Refining & Mining Co. reports for eight months ended August 31, 1940, estimated net profit of $3,204,017 after federal income taxes, depreciation, depletion, amortization, etc., equivalent after dividend requirements on 7% preferred stock, to $3.99 a share on 528,765 shares (par $50) of common stock.

This compares with $2,657,306 or $2.96 a common share for the eight months ended August 31, 1939.

Freeport Sulphur Net Nearly Doubled

Freeport Sulphur Co. reports for six months ended June 30, 1940, consolidated net profit of $1,497,811 after depreciation, depletion and federal income taxes, equal to $1.88 a share on 796,380 shares of capital stock. This compares with $654,995 or 82 cents a share in first half of 1939.

For quarter ended June 30, last, net profit was $636,578 equal to 80 cents a share, comparing with $338,530 or 42 cents a share in June quarter of previous year and $861,233 or $1.08 a share for quarter ended March 31, 1940.

Dow Earns $6.65

Report of Dow Chemical Co. and subsidiaries for year ended May 31, 1940, shows net profit of $7,159,167 after depreciation, federal income taxes, etc., equal after preferred dividends, to $6.65 a share on 1,031,988 no-par shares of common stock.

This compares with net profit in preceding year of $4,178,485 or $3.76 a common share.

Willard H. Dow, president, stated that it will be necessary in the near future to provide additional working capital, either by loans, sale of debentures or sale of stock, to expand plant to meet the increased demand for "almost every product" and the new demands placed upon the company for many new products.

Record sales—$37,743,467 against $26,762,282 in the previous fiscal year—and profits of the year just ended are indicative of the company's progress of research and development, Mr. Dow declared in his report to stockholders.

Air Reduction Earnings Up

Report of Air Reduction Co., Inc., and wholly-owned subsidiaries for quarter ended June 30, 1940, subject to audit and year-end adjustments, shows net profit of $1,663,106 after depreciation, federal income taxes, etc., equal to 61 cents a share on 2,711,491 shares of capital stock.

This compares with $1,205,340 or 47 cents a share on 2,563,992 shares in June quarter of previous year and $1,442,990 or 53 cents a share on 2,713,991 shares for quarter ended March 31, 1940.

For six months ended June 30, last, indicated net profit (as compiled from company's quarterly reports) was $3,106,096 equal to $1.14 a share, comparing with $2,232,595 or 87 cents a share in first half of 1939.

Dividends and Dates

Name	Div.	Stock Record	Payable
Alum. Co. of Am.	$1.50	Sept. 14	Oct. 1
Amer. Cyanamid Co., A & B, q.	15c	Sept. 12	Oct. 1
5% 1st & 2d cum. conv. pf., q.	$1.25	Sept. 12	Oct. 1
Amer. Smelting & Refining	50c	Nov. 1	Nov. 30
Pf., q.	$1.75	Oct. 4	Oct. 31
Amer. Zinc, Lead & Smelting pr., pf.	$1.25	Oct. 18	Nov. 1
Baker, (J. T.) Chem. Co., q.	12½c	Sept. 20	Oct. 1
Extra	12½c	Sept. 20	Oct. 1
Pf., q.	$1.37½	Sept. 20	Oct. 1
Celanese Corp. of Amer.	25c	Sept. 17	Oct. 15
Com. stk. div. of 1 sh. of com. for ea. 30 shs. of com. stk. held		Oct. 11	Dec. 10
7% cum. pr. pf., q.	$1.75	Sept. 17	Oct. 1
7% cum. pr. pf. q.	$1.75	Dec. 17	Jan. 1
7% cum. 1st port. pf. (S. A.)	$3.50	Dec. 17	Dec. 31
Chem. Fund, Inc., q.	8c	Sept. 30	Oct. 15
Com. Alcohols, pf., q.	10c	Sept. 3	Oct. 15
Corn Prods. Refining q.	$1.75	Oct. 4	Oct. 21
Pr., q.	$1.75	Oct. 4	Oct. 15
Dow Chem. Co.	75c	Nov. 1	Nov. 15
Pf., q.	$1.25	Nov. 1	Nov. 15
Du Pont (E. I.) de Nemours pf., q.	$1.12½	Oct. 10	Oct. 25
Eastman Kodak Co. q.	$1.50	Sept. 5	Oct. 1
Pf., q.	$1.50	Sept. 5	Oct. 1
Gen. Aniline & Film Corp., Class A	$2.00	Sept. 25	Sept. 28
Class B	20c	Sept. 25	Sept. 28
Glidden Co. (Interim)	30c	Sept. 12	Oct. 1
Pf., q.	56¼c	Sept. 12	Oct. 1
Harshaw Chem. Co. q.	25c	Sept. 24	Sept. 30
Extra	50c	Sept. 24	Sept. 30
7% pf., q.	$1.75	Sept. 24	Sept. 30
Hercules Pow. Co. pf., q.	$1.½%	Nov. 5	Nov. 15
Imperial Chem. Indus., Am. dep. rec.	3%	Sept. 26	Dec. 7
Interchem. Corp.	40c	Oct. 20	Nov. 1
6% pf., q.	$1.50	Oct. 20	Nov. 1
Johns-Manville Corp. 7% pf. q.	$1.75	Sept. 16	Oct. 1
Koppers Co. pf. q.	$1.50	Sept. 21	Oct. 1
Monroe Chem. pf. q.	87½c	Sept. 14	Oct. 1
Monsanto Chem. Co., pf., A & B, (semi-annual)	$2.25	Nov. 9	Dec. 2
Victor Chem. Wks.	35c	Sept. 20	Sept. 30
Westvaco Chlorine Prods., q.	35c	Oct. 10	Nov. 1
Pf. q.	37½c	Oct. 10	Nov. 1

Earnings Statements Summarized

Company:	Annual dividends	Net income 1940	Net income 1939	Common share earnings 1940	Common share earnings 1939	Surplus after dividends 1940	Surplus after dividends 1939
Clorox Chemical Co.:							
Year, June 30	§$3.00	$437,052	$379,666	$3.99	$3.46	......	......
Davison Chemical Corp.:							
Year, June 30	*f* ...	†135,431	†278,380	...	...	......	......
International Agricultural Corp.:							
Year, June 30	*f* ...	14,007	126,437	*p*.14	*p*1.26	......	......
International Vitamin Corp.:							
Year, June 30	*y* .30	120,052	97,694	.59	.48	......	......
U. S. Smelting, Refining & Mining Co.:							
*v*Eight months, Aug. 31	*y* 6.00	3,204,017	2,657,306	3.99	2.96	......	......
United States Plywood Corp.:							
July 31 quarter	*y* 1.20	176,247	111,459	*h*.80	*h*.50	......	......
Vanadium-Alloys Steel Co.:							
Year, June 30	*y* 3.25	855,210	90,889	4.29	.45	......	......
Vick Chemical Co.:							
Year, June 30	*y* 3.00	2,792,165	2,795,896	*h*4.05	*h*4.00	706,191	1,115,437

a On Class A shares; *b* On Class B shares; *c* On Combined Class A and Class B shares; *d* Deficit. *f* No common dividend; *j* On average number of shares; *k* For the year 1940; *p* On preferred stock; On Class A shares; *y* Amount paid or payable in 12 months to and including the payable date of the most recent dividend announcement; ‡ Indicated quarterly earnings as shown by comparison of company's reports for the 6 and 9 months periods; § Plus extras; *n* Preliminary statement; *h* On shares outstanding at close of respective periods. ** Indicated quarterly earnings as shown by comparison of company's reports for 1st quarter of fiscal year and the six months period. ‡‡ Indicated earnings as compiled from quarterly reports. † Net loss. * Not available.

Price Trend of Representative Chemical Company Stocks

	Aug. 31	Sept. 7	Sept. 14	Sept. 21	Net gain or loss last mo.	Price on Sept. 23, 1939	1940 High	1940 Low
Air Reduction Co.	41¾	41¾	40½	41	—¾	65⅞	58⅛	36½
Allied Chemical and Dye	156½	157	152	160	+3½	195	182	135½
Amer. Agric. Chem.	16	16½	15	15¾	—¼	23⅞	21	12⅛
American Cyanamid "B"	33½	34⅞	34⅜	36	+2½	32⅛	39⅞	26
Columbian Carbon	76¼	80	79¾	80½	+4¼	87	98¾	71
Commercial Solvents	9⅞	10¾	9⅜	9⅞	...	14¼	16⅝	8
Dow Chemical Co.	141	148½	136⅛	137½	—3½	139⅞	171	133
du Pont de Nemours	167½	175	167½	170¾	+3¼	182½	189¼	146½
Hercules Powder	82⅝	84¼	82	80	—2⅝	91½	100½	76¼
Mathieson Alkali	27⅞	28⅜	27½	28½	+⅝	36¼	32¾	21
Monsanto Chem Co.	90	93½	90	91	+1	109	119	86¾
Standard Oil of N. J.	34¾	36⅛	35	34⅞	+⅛	51	46½	29⅞
Texas Gulf Sulphur	31½	33	32	32⅞	+1⅜	37⅞	35¾	26⅞
Union Carbide and Carbon	74⅜	75½	71¾	74½	+⅛	92	88⅜	59⅞
U. S. Industrial Alcohol	19¼	21⅞	19¾	20¼	+1½	27	28	14

Merck Profit About $2,200,000 For First Half

Indicated income of Merck & Co. for the first six months of 1940, excluding the Canadian subsidiary, before income and excess profits taxes and before appropriation to reserve for contingencies, amounts to approximately $2,200,000, George W. Merck, president, says in a letter to stockholders.

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Chemical Stocks and Bonds

PRICE RANGE Sept. 1940 Last	High	Low	1939 High	Low	1938 High	Low	Sales (Number of shares) Sept. 1940	1940	Stocks	Par $	Shares Listed	Dividends	Earnings** $-per-share-$ 1939	1938	1937
NEW YORK STOCK EXCHANGE															
58	70¼	50	71½	53	61	46¼	2,400	33,200	Abbott Labs.	No	752,468	$2.05	2.61	2.43	2.51
41	58⅛	36½	68	45¼	67⅞	40	23,400	247,600	Air Reduction	No	2,563,992	1.50	1.98	1.47	2.86
163	182	135½	200½	151½	197	124	12,200	103,400	Allied Chem & Dye	No	2,214,099	9.00	9.50	5.92	11.19
15½	21	12⅛	24½	16	28½	22	3,000	33,000	Amer. Agric. Chem	No	627,987	1.30	1.22	2.23	2.95
5⅞	8¼	4⅛	11⅞	5½	15	9	4,000	50,200	Amer. Com. Alcohol	No	280,934	....	—.40	—2.05	3.23
29	35½	23	37	21	31½	20	2,800	17,400	Archer-Dan.-Midland	No	545,416	1.10	3.02	.43	5.03
65	80½	57	71	50	68	36	800	16,000	Atlas Powder Co.	No	250,288	3.00	3.82	2.69	4.40
117	124¾	112⅛	127	116	126¼	105	60	4,770	5% conv. cum. pfd.	100	68,597	5.00	18.94	14.77	20.90
28⅝	35½	20	30¼	13⅝	26⅝	9	33,300	616,800	Celanese Corp. Amer.	No	1,000,000	.50	3.53	.26	2.04
118½	119	105⅛	109⅞	84	96	82	1,090	25,920	prior pfd	100	164,818	7.00	37.72	15.05	27.07
11¼	20	10⅛	18	11½	17	7⅛	11,900	290,800	Colgate-Palm.-Peet	No	1,962,087	1.00	2.74	1.77	—.35
83	98¾	71	96	73	98½	53¾	2,500	23,200	Columbian Carbon	No	537,406	4.50	5.32	5.13	8.31
10¼	16⅝	8	16	8⅝	12¼	5⅞	36,000	752,500	Commercial Solvents	No	2,636,878	....	.61	—.11	.60
53⅛	65⅛	44½	67½	54⅞	70¾	53	9,900	138,500	Corn Products	25	2,530,000	3.00	3.32	3.18	2.52
169	179	165	177	150	177	162	......	5,300	7% cum. pfd.	100	245,738	7.00	41.18	39.69	32.96
17	23¼	12½	32⅝	18	40⅞	25	3,080	22,950	Devoe & Rayn. A.	No	95,000	....	2.05	—1.72	4.05
135¾	171	133	144⅝	101½	141	87⅞	26,400	87,400	Dow Chemical	No	1,034,988	3.00	3.76	3.91	4.15
174¾	189¼	146½	188½	126¼	154¾	90½	23,500	313,200	DuPont de Nemours	20	11,065,762	7.00	7.70	3.74	7.37
124⅝	126	114	124⅛	112	120½	109½	3,100	42,450	4½% pfd.	No	1,688,850	4.50	52.25	87.27	165.48
133	166¾	117	186⅛	138⅛	187	121½	11,100	135,200	Eastman Kodak	No	2,476,013	6.00	8.55	7.54	9.76
176	178	155	183½	155½	173	157	170	1,550	6% cum.	100	61,657	6.00	349.31	281.22	362.45
32⅝	38¾	24¾	36	18¼	32	19⅞	7,800	160,600	Freeport Sulphur	10	796,380	1.50	2.76	1.87	3.30
7	10	5½	10⅞	7	12⅛	6¾	4,100	36,100	Gen. Printing Ink	1	735,960	.80	.94	.62	1.32
14¼	19¾	11	24⅛	14	28½	13	4,900	84,300	Glidden Co.	No	829,989	.50	1.70	—.29	2.62
42	44⅝	30	47	34	51½	37	400	6,800	4½% cum. pfd.	50	199,940	2.25	4.27	1.03	12.72
103	113¼	89⅞	112¾	93	111	76¾	1,300	14,900	Hazel Atlas	25	434,409	5.00	6.64	4.97	6.67
80	100½	76¼	101½	63	87	42¾	3,200	76,300	Hercules Powder	No	1,316,710	2.85	3.65	1.95	2.97
128¼	133½	126¼	135½	128½	135¼	126⅝	370	4,480	6% cum. pfd.	100	96,194	6.00	60.87	35.31	50.75
24	29	16⅜	29½	16⅝	30⅝	14⅝	3,400	66,000	Industrial Rayon	No	759,325	.75	1.77	.24	.34
25½	47⅜	21¼	46¼	17½	34½	15	2,900	53,400	Interchem.	No	290,320	.40	4.10	.32	1.44
108	113	91	109½	90	98	80	240	4,930	6% pfd.	100	65,661	6.00	24.27	7.39	12.26
1½	2⅜	1	3⅝	1½	3⅞	2	3,800	47,300	Intern. Agricul.	No	436,048	....	—1.32	—0.003	.16
25	38	18⅛	41	16	29	15	1,300	14,200	7% cum. pfd.	100	100,000	....	1.26	7.01	7.70
27⅛	38⅞	19⅜	55¾	35	57⅝	36⅞	62,200	738,100	Intern. Nickel	No	14,584,025	2.00	2.39	2.09	3.31
33½	37⅛	26⅞	38	29	30¼	19½	400	11,700	Intern. Salt	No	240,000	1.75	1.92	2.29	2.11
20½	23¾	14⅜	22½	14½	24	19⅛	900	13,800	Kellogg (Spencer)	No	509,213	1.10	1.39	.71	2.81
43	53⅜	30	56¾	36½	58⅝	23¼	9,500	153,300	Libbey Owens Ford	No	2,513,258	2.75	3.21	1.57	4.19
14¼	18⅜	10⅛	19	13½	21½	12⅛	3,200	77,500	Liquid Carbonic	No	700,000	1.00	1.62	1.81	2.37
28½	32¾	21	37⅜	20⅜	36⅞	19¾	4,700	86,300	Mathieson Alkali	No	828,171	1.50	1.12	1.01	1.81
91½	119	86¾	114¾	85⅝	110	67	10,500	114,400	Monsanto Chem.	No	1,241,816	3.00	4.01	2.35	4.40
118½	119	110	121	110	117½	111	140	2,790	4½% pfd. A.	No	50,000	4.50	54.29	31.51	49.99
119¾	121½	113½	122½	112	...	...	100	2,330	4½% pfd. B.	No	50,000	4.50	54.29	31.51	49.99
18	22½	14⅛	27½	17⅞	31	17⅛	18,400	213,800	National Lead	10	3,095,100	.87	1.28	.75	.95
165⅛	173⅜	160	173⅛	152	178½	154	200	3,800	7% cum. "A" pfd.	100	213,793	7.00	27.04	20.03	22.86
143	148½	132	145	132	145½	127	190	2,860	6% cum. "B" pfd.	100	103,277	6.00	55.30	35.97	43.77
7¾	14¼	6⅛	17¾	8½	19½	9⅞	11,800	167,900	Newport Industries	1	620,459	....	.66	—.08	2.22
53	64⅝	42	70	50	76¼	40	4,000	116,700	Owens-Illinois Glass	12.50	2,661,204	2.00	3.17	2.02	3.51
64⅛	71¾	53	66	50⅝	59	39½	9,400	163,600	Procter & Gamble	No	6,325,087	2.25	3.80	2.59	4.08
116	118½	112⅛	119¾	112	122¼	114	360	7,290	5% pfd.	100	169,517	5.00	298.55	101.81	157.05
8⅝	13⅛	7⅝	17¼	9⅞	18⅝	10	12,100	150,800	Shell Union Oil	No	13,070,625	.50	.77	.70	1.44
105	108¼	95⅛	107⅞	98½	106½	93	1,000	13,500	5½ cum. pfd.	100	341,000	5.50	34.61	33.18	60.59
17⅛	23¼	12¼	29½	15½	34¾	18½	4,500	59,800	Skelly Oil	No	995,349	.75	1.99	2.27	6.07
24⅞	29	20¾	30	22⅝	35½	24¾	25,500	442,100	S. O. Indiana	25	15,272,020	1.25	2.24	1.82	3.16
33¼	46½	29⅞	53½	38	58⅝	39¾	59,500	850,200	S. O. New Jersey	25	26,618,065	1.25	3.27	2.86	5.64
6⅝	7¼	4¼	9⅛	4	8	3⅞	11,200	92,300	Tenn. Corp.	5	853,696	....	.41	.46	1.09
35⅜	47⅝	33	50¾	32½	49⅝	37⅝	44,300	570,200	Texas Corp.	25	10,876,882	2.00	3.02	2.13	5.02
33⅛	35¾	26⅞	38½	26	38	26	9,500	149,200	Texas Gulf Sulphur	No	3,840,000	2.00	2.04	1.81	3.03
74	88¾	59⅞	94¼	65½	90⅞	57	33,200	375,400	Union Carbide & Carbon	No	9,277,288	1.90	3.86	2.77	4.81
51⅜	65⅝	42½	69½	52	73½	39	2,200	37,900	United Carbon	No	397,885	3.00	3.81	3.78	5.91
23⅝	27	14	29⅝	13½	30¼	13½	8,700	100,800	U. S. Indus. Alcohol	No	391,238	....	.20	—1.08	1.24
32	43⅛	25	40	16	28⅞	11½	23,900	472,300	Vanadium Corp. Amer.	No	377,140	1.00	3.25	.61	2.22
26	31½	19	29¾	18¼	25¼	13½	1,300	30,600	Victor Chem.	5	696,000	1.40	1.59	1.05	1.01
2¼	4⅛	1¾	5¾	2½	5⅝	2¾	3,700	50,500	Virginia-Caro. Chem.	No	486,122	....	—1.57	—1.80	—.05
22	31¾	14	33¾	17	32⅛	15¾	4,000	43,100	6% cum. part. pfd.	100	213,052	....	2.41	1.90	5.88
35	38½	27¾	39¼	15¼	20⅛	10	2,200	41,300	Westvaco Chlorine	No	339,362	1.85	2.81	1.52	1.46
34	39¼	28⅞	39½	29	31½	20	6,300	31,200	cum. pfd.	30	192,000	1.50	6.64	4.19	4.09
NEW YORK STOCK EXCHANGE															
35⅞	39⅞	26	35¾	18⅝	30¼	15½	26,200	446,600	Amer. Cyanamid "B"	10	2,618,387	.60	2.07	.91	2.09
122½	127	98	112¾	76	92	50	1,625	20,725	Celanese, 7% cum. 1st pfd.	100	148,179	7.19	34.17	8.95	22.32
4	5⅞	2⅜	6¾	3	6¾	3	900	11,500	Celluloid Corp.	15	194,952	....	—.70	—2.73	—.92
3	7¾	2¾	7⅜	4½	12	6½	400	1,100	Courtauld's Ltd.	£1	24,000,000	.13	4.92%	.20%	8.64%
5⅝	8⅛	5	9¼	5	9⅞	6	300	15,200	Duval Texas Sulphur	No	500,000	....	1.25	.71	.43
72	92	60	68	30	41¼	27	500	15,950	Heyden Chem. Corp.	100	125,497	2.00	5.98	2.07	3.94
94	104	65	117	90	115½	55	3,000	48,600	Pittsburgh Plate Glass	25	2,192,824	4.00	4.94	3.00	8.53
79	100	62½	113½	81	117⅜	66	2,400	37,650	Sherwin Williams	25	638,927	2.75	5.96	2.43	8.76
109	114¾	106	116	106½	114⅛	107	270	2,510	5% cum. pfd.	50	132,189	5.00	35.08	8.76	45.50
PHILADELPHIA STOCK EXCHANGE															
181	185	158¾	179	135	167	121½	100	2,885	Pennsylvania Salt	50	150,000	6.00	10.52	6.29	11.79

PRICE RANGE Sept. 1940 Last	High	Low	1939 High	Low	1938 High	Low	Sales Sept. 1940	1940	Bonds	Date Due	Int. %	Int. Period	Outstanding $
NEW YORK STOCK EXCHANGE													
103	105¼	100⅛	103¾	98	105⅜	99¼	249,000	1,798,000	Amer. I. G. Chem. Conv.	1949	5½	M-N	$22,400,000
32	41	27½	41½	19	38	25⅛	13,000	827,000	Anglo Chilean Nitrate inc. deb.	1967	4½	J	10,400,000
105⅞	106⅛	100	102½	90	94	93	42,000	1,092,000	Industrial Rayon	1948	4½	J-J	7,100,000
30	39¾	28	37	21½	35⅜	24¾	125,000	1,235,000	Lautaro Nitrate inc. deb.	1975	4	J-D	27,200,000
21	21	21	30	16	35⅜	24¾	3,000	8,000	Ruhr Chem.	1948	6	A-O	1,500,000
97¾	98	93½	95¾	88¾	...	...	696,000	5,702,000	Shell Union Oil	1954	2½	J-J	85,000,000
104¾	106⅜	101⅛	106¼	97⅜	105⅜	100	83,000	2,257,000	Standard Oil Co. (New Jersey) deb.	1961	3	J-D	85,000,000
105¾	106⅜	100⅝	106½	94¼	103	98	47,000	2,206,000	Standard Oil Co. (New Jersey) deb.	1953	2¾	J-J	50,000,000
105⅝	106¾	102	105⅞	95¼	...	...	98,000	2,738,000	Texas Corp.	1959	3	A-O	40,000,000

* Paid in 1939, including extras but excluding dividends paid in stock. ** For either fiscal or calendar year.

New Trade Marks of the Month

EXPAN
429,538

MOR-ADE
431,777

KERYL
427,318

PERMANOL
431,319

ISO-LAN
431,413

TEGACID
431,414

TEGOL
431,415

TEGOSEPT
431,416

TEGO STEARATE
431,417

Hytakerol
431,937

CIDAN
432,524

MOSKENE
432,527

CYROTONE
432,955

VENRO
432,956

KLING
433,063

ANILOX
431,309

TRIMACOL
431,518

U.S.I. CHEMICAL NEWS
431,974

U.S.I. ALCOHOL NEWS
431,975

ASTM
425,131

MARTIN'S TERMI-TREAT
429,989

AQUALITE
432,074

Tubacide
432,146

CONALENE
433,081


433,022

PROREX
433,265

NEUTRAX
432,639

K
432,641

HOSDUR
429,277

KAYQUINONE
431,511

CISCOSOLV
431,646

CREMO-SILCONATE
432,356

TAKA-DIASTASE
432,483

DRIERITE
432,607

NYL-O-NOL
432,653

REMOSIL
432,667

RUSTICON
432,696

CORNTROL
433,364

Trade Marks Descriptions †

429,538. Fred Pusinelli, New York, N. Y.; March 13, 1940; for Chemical Preparation for cleaning and softening leather; since Feb. 1, 1940.

431,777. Massachusetts Chemical Co., Boston, Mass; May 10, 1940; for powder, having incidental water softening properties, for cleaning tile floors, sinks, bath rooms, and dishes; since Nov. 15, 1939.

427,318. The Sharples Solvents Corp., Phila., Pa.; Jan. 10, 1940; for synthetic organic chemicals; since June 22, 1938.

431,319. Monsanto Chemical Co., St. Louis, Mo.; Apr. 27, 1940; for chemicals used in tanning and the treatment of hides and leather; since Mar. 5, 1940.

431,413. Th. Goldschmidt Corp., New York, N. Y.; Apr. 31, 1940; for base for or ingredient of cosmetic creams, lotions, salves, ointments, emulsions, and lipsticks; since July, 1937.

431,414. Th. Goldschmidt Corp., New York, N. Y.; April 30, 1940; for base for or ingredient of cosmetic creams, lotions, salves, ointments, emulsions and lipsticks; since July 23, 1940.

431,415. Th. Goldschmidt Corp., New York, N. Y.; Apr. 30, 1940; for base for or ingredient of cosmetic creams, lotions, salves, ointments, emulsions, and lipsticks; since January, 1940.

431,416. Th. Goldschmidt Corp., New York, N. Y.; Apr. 30, 1940; for crystalline material, having preservative and antiseptic properties for oils, fats, waxes, gums, casein, cosmetic creams, lotions, salves, etc.; since November, 1935.

431,417. Th. Goldschmidt Corp., N. Y., N. Y.; Apr. 30, 1940; for base for or ingredient of cosmetic creams, lotions, salves, ointments and emulsions; since July, 1937.

431,937. Winthrop Chemical Co., Inc., N. Y., N. Y.; May 14, 1940; for medicinal preparation for the treatment of Hypoparathyroidism, Hypocalcemia and related conditions; since Apr. 17, 1940.

432,524. Givaudan-Delawanna, Inc., N. Y., C., N. Y.; May 31, 1940; for chemical products used in bactericidal, fungicidal, insecticidal and disinfectant preparations; since Nov. 2, 1939.

432,527. Givaudan-Delawanna, Inc., N. Y. C., N. Y.; May 31, 1940; for chemical products used as a perfume ingredient; since Mar. 2, 1934.

432,955. Venro Chemical Corp., Boston, Mass; June 12, 1940; for insecticides; since May, 1934.

432,956. Venro Chemical Corp., Boston, Mass; June 12, 1940; for insecticides; since January, 1937.

433,063. Merck & Co., Inc., Rahway, N. J.; June 15, 1940; for preparations to be used for the prevention of premature dropping of fruit; since June 8, 1940.

431,309. Interchemical Corp., New York, N. Y.; Apr. 27, 1940; for printing ink, and printing ink vehicles comprising resinous and oleoresinous varnishes; since April 10, 1940.

425,131. The American Society for Testing Materials, Phila., Pa.; Nov. 2, 1939; for publications relating to testing methods, specifications, and standards in engineering, industrial, and Allied fields, published from time to time; since 1919.

431,974. U. S. Industrial Chemicals, Inc., N. Y., N. Y.; May 15, 1940; for periodical publication; since May 1, 1940.

431,975. U. S. Industrial Chemicals, Inc., N. Y., N. Y.; May 15, 1940; for periodical publication; since May 1, 1940.

429,989. C. J. Martin & Sons, Inc., Austin, Tex; Mar. 26, 1940; for chemical preparation for preservation of wood from dry rot, decay and termites; since Sept. 28, 1939.

431,518. Buffer Laboratories, Boonton, N. J.; May 3, 1940; for colloidal suspension of Magnesium trisilicate; since Jan. 31, 1939.

432,074. Coal Processing Corp., Chicago, Ill.; May 18, 1940; for chemical compound for use as a water clarifier; since May 1, 1938.

432,146. Miller Chemical & Fertilizer Corp., Baltimore, Md.; May 20, 1940; for chemical compound used as an insecticide and fungicide spray; since March 1, 1938.

433,022. National Lead Company, N. Y., N. Y.; June 14, 1940; for tinning compound for treating surfaces to be soldered; March 20, 1940.

433,081. Eugenio Arcieri, New York, N.Y.; June 17, 1940; for chemical preparation for vitalizing combustion fuels; since Jan. 17, 1940.

433,265. Socony-Vacuum Oil Co., Inc., New York, N. Y.; June 21, 1940; for refined petroleum distillate oils suitable for use in textile manufacture, as penetrating oils, and for other industrial uses not including lubrication; since Jan. 6, 1939.

432,639. Kimble Glass Co., Vineland, N.J.; June 4, 1940; for chemical, scientific and laboratory glassware; since May 21, 1940.

432,641. Kimble Glass Co., Vineland, N.J.; June 4, 1940; for chemical, scientific and laboratory glassware; since April, 1920.

429,277. Jack D. Sartakoff, doing business as Progressive Household Chemical, New York, N. Y.; March 6, 1940; for liquid compounded of various chemicals, used for reducing runs in stockings; since Dec. 1, 1939.

431,511. Abbott Laboratories, North Chicago, Ill.; May 3, 1940; for product having the properties of Vitamin K; since April 23, 1940.

431,646. Cities Service Oil Co., Bartlesville, Okla.; May 7, 1940; for chemical solvents and particularly a solvent for injection into gas pipelines to prevent freezing; Feb. 17, 1937.

432,356. Sharp & Dohme, Inc., Phila., Pa.; May 25, 1940; for preparations for treatment of gastric disturbances and for rational control of gastro-intestinal acidity; since May 20, 1940.

432,483. Parke Davis, & Co., Detroit, Mich.; May 29, 1940; for digestants of starch foods, being pharmaceutical preparations in liquid, powder capsule, and tablet form; since 1895.

432,607. W. A. Hammond, doing business as W. A. Hammond Drierite Co., Yellow Springs, Ohio; June 3, 1940; for chemical desiccants; since June, 1934.

432,653. Quaker Chemical Products Corp., Conshohocken, Pa.; June 4, 1940; for softener, penetrant, and lubricant for textile fibres; since May 25, 1940.

432,667. Westvaco Chlorine Prods, Corp, New York, N. Y.; June 4, 1940; for magnesium compounds, in particular magnesium oxide; since April 10, 1940.

432,696. Philadelphia Quartz Co., Phila, Pa.; June 5, 1940; for substances for preventing rust corrosion, or scale in boilers, radiators and hot water systems; October 11, 1924.

432,796. Tropical Chemicals, Inc., Palm

† Trademarks reproduced and described include those appearing in *Official Gazette of the U. S. Patent Office*, July 23 to Sept. 3, 1940.

New Trade Marks of the Month

SUPREME 432,079

Rx 251 432,796

431,022

MECHLING'S 429,524

BELT-LIFE 432,375

Taccalin 432,790

PEREXCEREN 430,803

DOLGE 432,301

GeniFilm 433,220

WESTAMINE 433,643

TERAMINE 433,644

Plast-Iron 431,021

HICOLOR 430,217

FLEXIPLAST 432,078

AMERIPOL 433,007

CELONITE 433,014

NITROL 433,016

NITRON 433,017

SAFLEX 433,019

432,789

LLOYDRASTIS 433,833

BEETLE 430,379

LUSTRON 433,015

G 427,429

SULFAMONE 428,928

RESCOL 431,286

DE-ACIDITE 432,046

CURBAY X 432,205

ATLOX 432,888

KIRKSON 430,170

BERYLIZED 425,457

VUE-LITE 433,311

TEKNOCRAFT 431,373

AEROMINE FLOTATION REAGENT 433,202

CATAFLOAT FLOTATION REAGENT 433,203

AEROZIL FLOTATION REAGENT 433,204

SULFABENAMIDE 433,292

SULFOXAMIDE 433,293

EBONOL 433,348

Glyvarsenyl 433,645

(*Trade Mark Descriptions Continued*)

Beach, Fla.; June 7, 1940; for preparation for stimulating growth of the hair on the head; since March 20, 1940.

433,364. Stanco Incorporated, Wilmington, Del. & New York, N. Y.; June 25, 1940; for insecticides; since May 29, 1940.

431,022. Plastic Metals, Inc., Johnstown, Pa.; Apr. 20, 1940; for powdered metal for use in production of shaped and integrated metal articles; since March 22, 1940.

432,079. General Aniline & Film Corp., Binghamton, N. Y.; May 8, 1940; for photographic goods, particularly light sensitive films; since Nov. 16, 1937.

429,524. General Chemical Co., New York, N. Y.; March 13, 1940; for preparation suitable for cleaning refrigerators, sinks, garbage cans, toilet bowls and enamel and porcelain surfaces, and a cleanser suitable for cleaning painted and other surfaces and brushes and the like; since 1930 for cleanser for cleaning painted and other surfaces and 1892 for other preparation.

432,375. Blitz & Buchbinder, New York, N. Y.; May 27, 1940; for chemical preparation for cleaning, softening and preserving leather belts used for machine drives; since Apr. 15, 1940.

432,790. Taccalin Chemical Corp., New York, N. Y.; June 7, 1940; for belt dressings; since May 1, 1939.

430,803. Union Starch & Refining Co., Columbus, Ind.; April 15, 1940; for concentrated yeast liquid extract used in the treatment of Vitamin B deficiency; since March 16, 1940.

432,301. The C. B. Dolge Co., Westport, Conn.; May 24, 1940; for disinfectants, deodorants, insecticides, fungicides, germicides, since May 1938.

433,220. General Chemical Co., New York, N. Y.; June 20, 1940; for preparation for improving the distribution and adherence of insecticides on vegetation; since May 17, 1940.

433,643. West Disinfecting Co., Long Island City, N. Y.; July 2, 1940; for odorless disinfectant for washroom sanitation purposes; since May, 1940.

433,644. West Disinfecting Co., Long Island City, N. Y.; July 2, 1940; for odorless disinfectant for general use; since May, 1940.

431,021. Plastic Metals, Inc., Johnstown, Pa.; April 20, 1940; for powdered metal for use in the production of shaped and integrated metal articles; since March 22, 1940.

430,217. Rayonier Inc., San Francisco, Calif.; April 25, 1940; for wood pulp; since August 3, 1934.

432,078. Foster Grant Co., Inc., Leominster, Mass.; May 18, 1940; for plastic material of a vinyl acetate base; since May 8, 1940.

433,007. The B. F. Goodrich Co., New York, N. Y.; June 14, 1940; for composition of material composed wholly or in part of natural and synthetic rubber-like materials; June 6, 1940.

433,014. Monsanto Chemical Co., St. Louis, Mo.; June 14, 1940; for artificial plastic materials of cellulose esters and the like in the form of sheets, rods, tubes, plates and pre-forms; since May 29, 1940.

433,016. Monsanto Chemical Co., St. Louis, Mo.; June 14, 1940; for artificial plastic materials of cellulose esters and the like in the form of sheets, rods, tubes, plates, and pre-forms; since May 28, 1940.

433,017. Monsanto Chemical Company, St. Louis, Mo.; June 14, 1940; for artificial plastic materials of cellulose esters and the like in the form of sheets, rods, tubes, plates and pre-forms; since May 29, 1940.

433,019. Monsanto Chemical Co., St. Louis, Mo.; June 14, 1940; for plastic interliner for safety glass; since May 29, 1940.

432,789. Taccalin Chemical Corp., New York, N. Y.; June 7, 1940; for belt dressings; since March 1, 1940.

433,833. S. B. Penick & Co., doing business as Lloyd Bros., Pharmacists Inc., New York, N. Y. and Cincinnati, Ohio; July 10, 1940; for medicinal preparations of hydrastis; since Nov. 8, 1939.

427,429. The Glidden Co., Chicago, Ill.; January 13, 1940; for soya bean meal sold for use as a fertilizer and as an ingredient of fertilizers; since October 10, 1939.

430,379. American Cyanamid Co., New York, N. Y.; April 5, 1940; for condensation products of aldehydes and amines, specifically synthetic resins or compositions thereof, in solid or liquid form; since January, 1926.

433,015. Monsanto Chemical Co., St. Louis, Mo.; June 14, 1940; for artificial resins in solid form suitable for molding, casting or extruding; since May 28, 1940.

428,928. Parke, Davis & Co., Detroit, Mich.; Feb. 26, 1940; for compound intended for treatment of streptococcic and other infections; since Feb. 5, 1940.

431,286. Bennett, Inc., Cambridge, Mass.; April 27, 1940; for aqueous rosin-containing and rosin-wax containing emulsions adapted for use as a paper-sizing composition; since Feb. 13, 1940.

432,046. The Permutit Co., New York, N. Y.; May 17, 1940; for absorption materials used in the purification and treatment of water; since May 21, 1940.

432,205. U. S. Industrial Chemicals, Inc., New York, N. Y.; May 21, 1940; for dry product obtained from distillery waste having various uses, including use in the conditioning of coal to increase the efficiency of combustion; since April 4, 1938.

432,888. Atlas Powder Co., Wilmington, Del.; June 11, 1940; for agricultural parasiticides; since May 20, 1940.

433,170. Morris P. Kirk & Sons, Inc., Los Angeles, Calif.; June 19, 1940; for chemicals, particularly copper sulfate, zinc sulfate, and preparations and solutions for the same; since 1925.

425,457. Cooper-Wilford Beryllium, Ltd., Phila., Pa.; Nov. 9, 1939; for sheets of nonferrous metal coated or plated with beryllium; since Nov. 1, 1939.

433,311. Monsanto Chemical Co., St. Louis, Mo.; June 24, 1940; for translucent plastic sheets, tubes, plates, or discs capable of transmitting or diffusing light; since June 11, 1940.

431,273. Orbitex, Inc., New York, N. Y. April 29, 1940; for textile oils and finishes and compounds for the processing of textiles of all descriptions; since Feb. 15, 1940.

433,202, 433,203, 433,204. American Cyanamid Company, New York; June 20, 1940; for flotation reagents for use in the concentration of minerals; since April 20, 1940.

433,292, 433,293. Sharp & Dohme, Inc., Philadelphia, Pa.; June 22, 1940; for chemotherapeutic agents; since June 21, 1940.

433,348. Jacob F. Buckman, New Haven, Conn.; June 25, 1940; for chemical compound for oxidizing ferrous metal articles; since March 21, 1940.

433,645. Winthrop Chemical Co., Inc., New York, N. Y; July 2, 1940; for arsenic compound for treatment of syphilis; since June 6, 1940.

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A Complete Check—List of Products, Chemicals, Process Industries

Agricultural Chemicals

Phosphatic product consisting predominantly of compound composed of calcium and phosphate radicals and a radical of group consisting of chloride and nitrate. No. 2,211,918. John W. Turrentine.

Method manufacturing mixed superphosphate fertilizers. No. 2,213,243. Leroy H. Facer to Facerform Corp.

Soluble organic phosphate fertilizer materials. No. 2,213,513. Wilder D. Bancroft, James K. Wilson and John E. Rutzler, Jr.

Method of soil fertilization. No. 2,213,514. Wilder B. Bancroft, James K. Wilson and John E. Rutzler, Jr.

Mixture of organic phosphates and calcareous neutralizing agents. No. 2,213,515. Wilder D. Bancroft, James K. Wilson and John E. Rutzler, Jr.

Fertilizer mixture. No. 2,213,619. Wilder D. Bancroft, James K. Wilson and John E. Rutzler, Jr.

As new fertilizer, an organic phosphate. No. 2,213,620. Wilder D. Bancroft, James K. Wilson and John E. Rutzler, Jr.

Agricultural insecticide. No. 2,215,603. Leo M. Christensen and Harry Miller to The Chemical Foundation, Inc.

Fertilizer containing lithium compound in combination with at least one of group of oxides consisting of manganese dioxide, manganic oxide, hydrated forms of these oxides, the co-active lithium manganese composition to be suitable for use both separately and with other plant foods. No. 2,215,878. Cecil E. Johnson to International Cigar Machinery Co.

Beneficiation of phosphate rock by froth flotation. No. 2,216,040. Harry L. Mead and Ernest J. Maust to American Cyanamid Co.

Cellulose

Cellulosic product and process for preparing same. No. 2,211,931. Emmette F. Izard, to E. I. du Pont de Nemours & Co.

Artificial cellulosic material bonded to rubber and method of producing the bond. No. 2,211,945. Wm. H. Charch, to E. I. du Pont de Nemours & Co.

Artificial cellulosic material bonded to rubber and method of producing the bond. Nos. 2,211,948-51. Albert Hershberger to E. I. du Pont de Nemours & Co.

Artificial cellulosic material bonded to rubber and method of producing the bond. No. 2,211,959. Dorothy B. Maney to E. I. du Pont de Nemours & Co.

Artificial cellulosic material bonded to rubber and method of producing the bond. Nos. 2,211,960-61. Fred M. Meigs to E. I. du Pont de Nemours & Co.

Artificial cellulosic material bonded to rubber and method of producing the bond. No. 2,211,964. Arthur P. Tanberg to E. I. du Pont de Nemours & Co.

Process of imparting hydrophobic properties to cellulose fibers by incorporating therewith an N-methyl compound of an acid amide of a monocarboxylic and ammonia. No. 2,211,976. Franz Emil Hubert, Erwin Heisenberg and Adolf Steindorff and Ludwig Orthner to General Aniline & Film Corp.

In process surfacing sheet cellulose with alkaline suspension of oil seed flour, inhibiting darkening of surface by subjecting said flour to action of water, alkaline agent and hydrogen peroxide, and applying the product to sheet cellulose. No. 2,212,525. Frederick V. Lofgren to Glenn Davidson.

Manufacture cellulose from lignin-containing cellulosic materials. No. 2,214,125. Henry Dreyfus.

Purification of cellulose esters. No. 2,214.943. John S. Tinsley to Hercules Powder Co.

Process consolidating ligneous cellulosic material into dense, compact, coherent board or slab material. No. 2,215,244. Harry K. Linzell to United States Gypsum Co.

Ethanolamine hydrochloride softener for regenerated cellulose. No. 2,215,974. Franklin T. Peters to E. I. du Pont de Nemours & Co.

Insoluble aliphatic ethers of cellulose. No. 2,216,095. Edgar C. Britton and Kenneth G. Harding to The Dow Chemical Co.

Chemical Specialty

Antiseptic, aqueous solution of iodine containing an alkylamine hydriodide as solubilizing agent. No. 2,211,837. Robb V. Rice and George D. Beal to Gane & Ingram, Inc.

Compounded mineral oil containing about 0.1% aluminum phenate. No. 2,211,972. Elmslie W. Gardiner and George H. Denison, Jr., to Standard Oil Co.

Material for treatment of hydrocarbons to break up and prevent clogging and deposition of sludge in fuel line. No. 2,211,987. Ed. F. Quirke.

Lubricating oil compositions. Nos. 2,212,020-021. Waldresee B. Hendrey to The Texas Co.

Method producing luminous glass tubes comprising blowing shellac containing color pigment therein, and subjecting tube to heat sufficient to soften glass and impregnate pigment in wall of tube. No. 2,212,134. Albert Steadman.

Inorganic crystalline luminescent material. No. 2,212,209. Humboldt W. Leverenz to Radio Corp. of America.

Article of manufacture containing hemp hurds. No. 2,212,226. Martin J. Connolly.

Producing synthetic drying oil from castor oil. No. 2,212,385. John S. Brod.

Method washing fruits and vegetables to remove spray materials. No. 2,212,432. Robert L. Brandt to Colgate-Palmolive-Peet Co.

Process for dehydrating peat or the like. No. 2,212,444. Oskar Linker, Herbert Linker, executor of Oskar Linker, deceased, to Zdenko Graf Schonborn.

Processing and drying egg whites. No. 2,212,445. Verne D. Littlefield & Norman C. Fischer to Armour and Co.

Method and apparatus for the production of fibres from molten glass and similar meltable materials. No. 2,212,448. Piero Modigliani to Owens-Corning Fibreglas Corp.

Disinfectant and plant protective composition of acid reaction comprising a thiocyanate and a substance selected from metals and metal compounds capable of forming a sulfide which is slightly soluble in acids. No. 2,212,464. Edmund Weidner.

Foam-forming compound for extinguishing fire, consisting of a solution of solubilized proteinous material and small amount of soluble aluminum compound. No. 2,212,470. Karl Friedrich.

Method manufacturing insecticidal composition. No. 2,212,519. William K. Griesinger to The Atlantic Refining Co.

Organic insecticide and its use. No. 2,212,529. James W. Swaine to General Chemical Co.

Liquid insecticidal composition having dispersed therein as active toxicant an aryloxypolyalkylene ether iodide. No. 2,212,536. Edgar C. Britton, Gerald H. Coleman and John W. Zemba to The Dow Chemical Co.

Composition adopted for use as an adhesive. No. 2,212,557. Jordan V. Bauer to Stein Hall Mfg. Co.

Casein paint and method of preparing the same. No. 2,212,566. Walter B. Kinney to The Borden Co.

Process of dyeing pelts, hairs, or feathers. No. 2,212,608. Erich Lehmann to General Aniline & Film Corp.

Adhesive composition and method of preparing same. No. 2,212,611. Alexander D. Macdonald to B. B. Chemical Co.

Method treating fresh fruit comprises producing an atmosphere with air and volatile organic solvent, containing a wax dissolved therein, forcibly contacting surface of the fruit with such atmosphere sufficiently to deposit waxy material thereon without wetting surface of the fruit with the solvent to the extent that it will produce furning of the fruit. No. 2,212,621. Jagan N. Sharma to Food Machinery Corp.

Plant spray compound. No. 2,212,701. Henry J. Reynolds.

Method of treating hides, skins and pelts. No. 2,212,750. Julius Pfannmuller and Hans Schleich to Wallerstein Co., Inc.

Process for production of chlorinated vegetable, fibrous material possessing properties of plastic flow, under heat and pressure. No. 2,212,866. Earl C. Sherrard, Edward Beglinger, John P. Hohf and Ernest Bateman, deceased, by William T. Bateman, administrator to Henry A. Wallace, Secretary of Agriculture.

Lubricant comprising mineral lubricating oil and from ½ to 20% jojoba oil containing 10 to 20% combined sulfur. No. 2,212,899. Marcellus T. Flaxman to Union Oil Co. of Calif.

Light sensitive material consisting of sheet support carrying light sensitive diazo compound and hydroxy naphthoimidazole compound as coupling component. No. 2,212,959. Maximilian P. Schmidt and Oskar Sus to Kalle & Co., Aktiengesellschaft.

Preparation of catalysts and their use in the polymerization of hydrocarbons. No. 2,212,995. Albert Wassermann.

Ink for printing on textiles contains nitrocellulose pigment, mixture of mono-alkyl ethers of ethylene and diethylene glycol, and petroleum naphtha. No. 2,213,006. Melvin W. Johnson to Pittsburgh Plate Glass Co.

Formation sealing composition for use in oil wells comprises colloidal jell of clay of the Frazier Mountains and Mojave types combined with cement, calcium chloride, unslaked lime, bentonite, litharge and caustic, which upon addition of water undergoes chemical change and hardens to impermeable mass. No. 2,213,038. Vern W. David.

Textile marking composition not attacked by CCl_4. No. 2,213,126. Wilbur L. Jones to Interchemical Corp.

Process preserving ensilage comprising spraying with aqueous solution of a derivative of dehydrated orthophosphoric acid. No. 2,213,127. Friedrich P. Kerschbaum and Ernest C. Dybdal to Monsanto Chemical Co.

Method decarbonizing cylinder heads in gas engines, comprises feeding into fuel gases at intake manifold while engine is in operation a vaporized chlorine gas. No. 2,213,132. Francis R. Ackerman.

Insect repellent composition. No. 2,213,156. Philip Granett to National Carbon Co., Inc.

Insecticidal composition containing a phenyl benzyl ether having an organic acyl group as a substituent in at least one of benzene rings. No. 2,213,214. William F. Hester to Rohn & Haas Co.

Insecticidal compositions. Nos. 2,211,215-219. William F. Hester to Rohm & Haas Co.

Plant stimulant powder comprising petroleum distillates and a powder, the powder constituent including pyrethrum powder substantially exhausted of pyrethrins. No. 2,213,260. George R. Rinke to John Powell and Co., Inc.

Process of preparing dried milk. No. 2,213,283. Ninni M. Kronberg to Svenska Mjolkprodukter Aktiebolag.

Abrasive articles and the method of manufacturing the same. No. 2,213,332. Albert L. Ball to The Carborundum Co.

Composition comprising rubber and copolymer of an aliphatic monoolefine. No. 2,213,423. Peter J. Wiezevich, judicial change to Peter J. Gaylor to Standard Oil Development Co.

Ceramic composition for tiles, etc., consisting of 5-45% talc, .1-5% barium carbonate, balance being clay, flint and feldspar. No. 2,213,495. Donald Hagar.

Method making artificial base exchanging composition of matter. No. 2,213,530. Bruno Montero to Investo Company.

Lubricant comprising hydrocarbon oil and minor proportion of halogenated aromatic hydroxy compound. No. 2,213,532. Carl F. Prutton and Albert K. Smith to The Lubri-Zol Development Corp.

Elastic composition consisting substantially of gluten, spirits of turpentine, sulfuric acid and glycerine. No. 2,213,549. James C. Konow.

Road surfacing composition, comprising asphalt-free spent decolorizing clay impregnated with mineral oil resins obtained from refining of petroleum oil mixed with calcareous material. No. 2,213,576. William R. Brison to Standard Oil Development Co.

Inhibiting agent for gasoline and method of producing same. No. 2,213,596. Albert J. Shmidl and Joshua M. Smith to Standard Oil Development Co.

Gas purifying material free from hydrogen sulfide generating organisms. No. 2,213,615. Gilbert E. Seil to E. J. Lavino and Co.

Cleaning powder consisting of synthetic alumina in adsorbent form together with adsorbent from class consisting of synthetic zeolite, Fuller's earth, diatomaceous earth, gelatinous silica and hydrous aluminum silicate. No. 2,213,641 Urlyn C. Tainton.

Lubricant consisting of hydrocarbon oil and small quantity of organic compound containing at least 2 S atoms in heterocyclic ring. No. 2,213,-804. Bert H. Lincoln and Gordon D. Byrkit to Continental Oil Co.

Concrete curing composition and process. No. 2,213,806. Stanley S. Sorem to Shell Development Co.

Lubricating oil and method of lubrication therewith. No. 2,213,856. Elmer W. Cook to Tide Water Associated Oil Co.

Gear lubricant and method of making it. No. 2,211,921. Lawrence C. Brunstrum, George W. Flint, Fred H. MacLaren and Elmer W. Adams to Standard Oil Co., corp. of Indiana.

In preparation of a grease, improvement comprising preparing soap by

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saponifying long-chain alkyl nitrile with saponifying agent. No. 2,211,-941. Fred W. Sullivan, Jr., to Standard Oil Co., corp. of Indiana.

Earth bore coating mixture consisting of clay, water and lignin. No. 2,212,108. Vernon B. Zacher to Tidewater Assoc. Oil Co.

Flameproof composition comprising substantially non-volatile combustible organic material and, as fire-retardant, the water soluble product obtained by reaction of urea and sulfamic acid in fused state. No. 2,212,152. Martin Eli Cupery to E. I. du Pont de Nemours & Co.

Method manufacturing a soda soap grease. No. 2,212,189. Lawrence C. Brunstrum to Standard Oil Co., corp. of Indiana.

Preparation of water resistant amylaceous compositions. No. 2,212,314. Jordan V. Bauer & Don M. Hawley to Stein Hall Manufacturing Co.

Composition of matter consisting substantially entirely of white oil and from 1 to 50 parts of acid selected from group consisting of sulfuric acid, chlor-sulfonic acid and a mono-alkyl sulfuric acid in about one million parts of white oil. No. 2,212,644. Clarence M. Loane to Standard Oil Co., Chicago, corp. of Indiana.

Photographic color forming developer comprising aromatic amino developing compound and condensation product of one molecule of a pyrazole-5-one having reactive methylene group in 4-position and one molecule of a compound selected from group consisting of aldehydes and ketones. No. 2,213,986. John D. Kendall and Ronald B. Collins to Ilford Limited.

Lubricating composition comprising major proportion of mineral oil and halogenated thio-ether. No. 2,213,988. Bert H. Lincoln and Alfred Henriksen, deceased, by John W. Wolfe, administrator to The Lubri-Zol Development Corp.

Photographic emulsion containing cyanine dyestuff containing fatty acid radical united in w-position to carboxyl-group of said radical to the N-atom of each of the heterocyclic rings. No. 2,213,995. Oskar Riester and Gustav Wilmanns to General Aniline & Film Corp.

Yeast manufacturing nutrient medium. No. 2,214,028. Ejnar A. Meyer to Standard Brands, Inc.

Wetting agent, detergent, and emulsifier. No. 2,214,051. Peter J. Gaylor to Standard Oil Development Co.

Surgical dressing comprising yarns, filaments or fibers of partially saponified stable organic esters of cellulose. No. 2,214,124. Camille Dreyfus.

Material for modeling sculpture work consisting of fine sand, metal powder, talcum powder, and liquid solder. No. 2,214,126. Fritz F. Engel.

Water-dispersible composition comprising major proportion of oil with lesser quantity of organic compound. No. 2,214,152. Benjamin G. Wilkes to Carbide & Carbon Chemicals Corp.

Chemical composition for acid hardening photographic fixing baths. No. 2,214,216. Lawrence J. Webster to Defender Photo Supply Co.

Sheet material comprising sheet of non-sized paper, impregnated and covered with adhesive material consisting of glue, polyhydric alcohol and invert sugars. No. 2,214,231. Grace P. Ketter and George Wagner.

Petroleum hydrocarbons containing .1-.0005% redwood tannin composition. No. 2,214,251. Harry F. Lewis to The Institute of Paper Chemistry.

Cleaning, polishing and waxing composition for polishing enamel surfaces. No. 2,214,263. Frederick A. Weihe, Jr., to McAleer Mfg. Co.

Adhesive for leather. No. 2,214,286. Josef Schmucker.

Tree banding composition non-fluid at high atmospheric temperatures, very sticky at all temperatures at which insects are active and substantially non-film forming on long exposure to atmosphere. No. 2,214,326. Kenneth Gregory to California Spray-Chemical Corp.

Heat insulation material of light weight highly cellular mass of fatty acid and zinc stearate. No. 2,214,358. Robert C. Williams to The Ironsides Co.

Non-corrosive, extreme pressure lubricant. No. 2,214,379. Franz R. Moser and Marinus C. Tuyn to Shell Development Co.

Frozen combustibles having transparent ice glaze formed of aqueous solution of H_2O_2 in amount sufficient to impart non-cracking characteristics to said glaze. No. 2,214,398. Robert H. Bedford ½ to Allen T. Sherman.

Lubricating oil with oxalic acid in sufficient amount to stabilize oil. No. 2,214,401. Michael R. Cannon and Kegham A. Varteressian.

Process sterilizing non-acid food products. No. 2,214,419. Charles L. Jones to Continental Can Co.

Lubricating oil having lake-forming substance in solution to stabilize against bearing corrosion. No. 2,214,433. Kegham A. Varteressian.

Process stabilizing lubricating oil comprising addition of stabilizing substance resulting from attaching 3 phenolate groups to a single arsenic atom. No. 2,214,444. Kegham A. Varteressian.

Stable photographic silver halide emulsion. No. 2,214,446. Fritz Albers and Hans Nitze, Gustav Schaum and Edith Weyde to General Aniline & Film Corp.

Soluble cutting oil base comprising water-insoluble soap of acid selected from group consisting of naphthenic acids and unsaturated higher fatty acids, an emulsifier and a mineral oil. No. 2,214,634. Bernard A. Dombrow to National Oil Products Co.

Luminescent material containing cadmium, manganese, sodium, fluorine, phosphorous, and oxygen. No. 2,214,643. Alfred H. McKeag to General Electric Co.

Metal coated plastic material and method of producing the same. No. 2,214,646. Bernard F. Walker to Metaplast Corp.

Process for softening waters of temporary hardness. No. 2,214,689. Harry Burrell to Ellis-Foster Co.

Process increasing effectiveness of insecticides which consist essentially of chlorinated hydrocarbon compounds. No. 2,214,782. Hans von Phillip to Fritz Schulz jun.

Lubricating oil compositions, constituents thereof and methods of manufacturing the same. No. 2,214,875. Troy Lee Cantrell and Jay S. Stockhardt, to Gulf Oil Corp.

Heat insulation material for boilers and like. No. 2,214,904. Albert S. Johnson.

Package of adsorbent material comprising closed container of open mesh fiber fabric inert to H2 SO4 and a charge of adsorbent material. No. 2,214,925. Robert G. Guthrie to Peoples Gas By-Products Corp.

Ceramic body for spark plug insulators. No. 2,214,931. Taine G. McDougal and Helen Blair Barlett to General Motors Corp.

Method of treating borosilicate glasses. No. 2,215,039. Harrison Porter Hood and Martin Emery Nordberg to Corning Glass Works.

Glass containing thallous chloride which will fluoresce substantially white when irradiated at wave length of about 3650-A and which is free from second group sulfides. No. 2,215,040. Harrison P. Hood to Corning Glass Works.

Mortar-bonded glass and the like structure. No. 2,215,048. Rob R. McGregor and Earl L. Warrick to Corning Glass Works.

Process comprising coating woven glass fabric with composition consisting of cellulose nitrate, castor oil, pigment, ethyl acetate, ethyl alcohol. No. 2,215,061. Cornelius Anthony Alt, to E. I. du Pont de Nemours & Company.

Process for the manufacture of fireproof thermal and acoustical insulation articles. No. 2,215,078. Conrad Gérard Francois Cavadino to Gyproc Products Limited.

Material and process for obtaining metal printing plates with silver halide emulsions. No. 2,215,128. Charles Edmund Meulendyke.

Process for treating mineral fibrous substances, such as glass wool, slag wool or the like which comprises forming fibers from molten material and while still plastic coating with certain dust to make them more suitable for spinning and weaving. No. 2,215,150. Clemens Hannen.

Embalming fluid containing chlorides of rare earth metals which will form insoluble compounds with the proteins of the body embalmed. No. 2,215,154. Hilton Ira Jones to National Selected Morticians, Inc.

Process bringing out and intensifying in durum wheat products the material color of the wheat. No. 2,215,168. Anderson W. Allred.

Method making frost resistant glass comprising mixing glass-forming batch with alcohol and water, heating mixture to dryness, then melting thus treated batch and forming glass articles from the melt. No. 2,215,-209. Fred Cornetto to Maurice M. Sullivan.

Process of forming ceramic bodies. No. 2,215,214. Henry J. Galey to Norbert S. Garbisch.

Method manufacturing translucent ceramic bodies. No. 2,215,215. Norbert S. Garbisch.

A stable lemon juice composition consisting of fresh lemon juice and acetic acid vinegar, the acetic acid of said composition being about 1.5 to 3 per cent. No. 2,215,334. Clarence E. Nelson to Kraft Cheese Co.

Roofing or surfacing material. No. 2,215,349. Sidney Lanier.

Process making molded straw board. No. 2,215,353. Joseph W. Gill to United States Gypsum Co.

An abrasive article comprising particles of abrasive and an aminotriazine-aldehyde resin cured in contact therewith. No. 2,215,380. Robert C. Swain and Donald W. Light to American Cyanamid Co.

Sulfur composition adapted for addition to lubricating oil. No. 2,215,-432. Carl F. Swinehart to The Harshaw Chemical Company.

Method for the manufacture of sterilized catgut. No. 2,215,453. János Buchgarber to Jenö Rakonitz.

Manufacture of ceramic dielectrics. No. 2,215,478. Werner Rath and Hans Handrek to Porzellanfabrik Kahla.

Method manufacturing artificial fuel from coal, waste lubricating oil, sodium chloride, distilled water, and a liquid asphalt. No. 2,215,536.

Process for making a floating soap. No. 2,215,539. John W. Bodman to Lever Bros. Co.

Developing composition for rendering printing surfaces receptive to printing ink, comprising a mixture of asphalt, carbon black, pitch, petrolatum, turpentine and phenol. No. 2,215,551. William S. Fraula to The American Brake Shoe and Foundry Co.

Lubricating composition containing major proportion of viscous hydrocarbon lubricant and minor proportion of phthalic ester. No. 2,215,590. George M. Maverick to Standard Oil Development Co.

Lubricating composition which comprises a lubricant and small quantity of an oil soluble organic substituted cyanamide of formula $X=N—CN$ in which X is an organic divalent radical. No. 2,215,591. Joseph F. Nelson to Standard Oil Development Co.

Artificially colored granules and method of producing same. No. 2,215,-600. Marion H. Veazey to The Patent and Licensing Corp.

Composition of matter for removing poison from tobacco smoke. No. 2,215,620. Konstantin Skumburdis.

Process making light cellular concrete blocks, planks and similar articles. No. 2,215,812. Philip Kaplan to The Richards Chemical Works, Inc.

Metallic abrasive or blast material. No. 2,215,828. John F. Ervin.

Amylaceous composition of strong adhesive properties containing amylaceous substances as sole bonding agent and water soluble urea in amount from 25-50% based on total weight. No. 2,215,846. Hans F. Auer to Stein Hall Mfg. Co.

Dry adhesive base composition adapted to form gelatinous adhesive film forming dispersion upon addition of water. No. 2,215,847. Hans F. Bauer to Stein Hall Mfg. Co.

Amylaceous remoistening adhesive. No. 2,215,849. Hans F. Bauer to Stein Hall Mfg. Co.

Liquid nail polish having nitro-cellulose base containing not more than 5% by weight of substantially neutral water soluble organic solid materials. No. 2,215,898. Robert J. Anderson to The Vorac Co.

Method preparing substantially non-bitter, edible product from citrus waste material. No. 2,215,944. Daniel B. Vincent.

Method of forming fluid pervious ceramic bodies. No. 2,215,962. Earnest T. Hermann.

Method making vitreous enameled articles on metal base by wet enameling process. No. 2,216,017. Archer L. Matthes to Bomat, Inc.

Coal Tar Chemicals

Amino anthraquinone compounds. No. 2,211,943. Richard S. Wilder to National Aniline & Chem Co., Inc.

6-chloro-diphenyl-methane-2-carboxylic acid compounds and a process for preparing the same. No. 2,212,056. John M. Tinker, Adrian L. Linch to E. I. du Pont de Nemours & Co.

Treatment of crude liquid coal products comprising transforming phenolic compounds contained therein into liquid hydrocarbons without utilization of hydrogen by heating said coal products with finely divided zinc. No. 2,213,272. Henry Dreyfus.

Process for purifying anthracene. No. 2,213,755. John A. C. Yule to Eastman Kodak Co.

Method producing asphaltic product of relatively low temperature susceptibility and high ductility. No. 2,215,074. Vladimir L. Shipp, Arthur H. Boenau, James W. Ramsay to Socony-Vacuum Oil Co., Inc.

Sulfonic acids of aromatic sulfonic and halides and process of making the same. No. 2,215,083. Walter Mieg and Franz Wieners to General Aniline & Film Corp.

Process for the production of valuable hydrocarbon products by the extraction of solid carbonaceous materials. No. 2,215,190. Mathias Pier and Ernst Donath-Mannheim, to Standard I. G. Company.

Method hydrogenation finely divided coal. No. 2,215,206. Burnard S. Biggs and Joseph F. Weiler to Carnegie Institute of Technology.

Production of valuable liquid products from pressure extracts of solid carbonaceous material. No. 2,215,869. Heinrich Buetefisch, Karl Winkler, Hermann Kaufmann and Rudolf Bemmann to Standard-I. G. Co.

Process for saturation by hydrogenation of liquid olefin polymers boiling within range of gasoline. No. 2,215,876. Paul Herold, Walter Kroenig, Hermann Kaufmann and Ernst Donath to Standard-I. G. Co.

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Coatings

Preparation of pigmented coatings. No. 2,211,912. Patrick J. Ryan to Reichhold Chemicals, Inc.

Composition for forming continuous film suitable for coating paper and the like. No. 2,211,992. Peter A. van der Meulen to John R. Ditmars.

Improvement in film-forming protective and decorative lacquer coating composition in which a film-forming substance such as cellulose esters, chlorinated rubber, synthetic rubber and mixtures thereof is dissolved in a non-aqueous, volatile, organic solvent or solvent mixture. No. 2,212,603. Cleveland B. Hollabaugh to Hercules Powder Co.

Thin, flexible, slipper, non-fibrous, transparent sheet provided with a moisture-proof coating. No. 2,213,252. James A. Mitchell to E. I. du Pont de Nemours & Co.

Production coating composition adapted when diluted to be applied by dipping or spraying. No. 2,213,557. Wendell H. Tisdalle and Albert L. Flenner to E. I. du Pont de Nemours & Co.

Reissue. Method making coated abrasive products comprises coating backing material with liquid resin and applying abrasive grains and catalyst to cause resin to solidify and attach abrasive grains to said backing. No. 21,552. Raymond C. Benner and Romie L. Melton to The Carborundum Co.

Method coating iron pipe to render it resistant to dilute acids. No. 2,214,062. Abraham B. Miller to Hercules Powder Co.

Coating composition highly resistant to oils and greases. No. 2,214,127. George R. Ensminger to E. I. du Pont de Nemours & Co.

Coating composition highly resistant to chalking or bronzing. No. 2,214,667. George R. Ensminger to E. I. du Pont de Nemours & Co.

Flat varnish comprising insoluble metallic oiticicate dispersed therein a flatting agent. No. 2,214,771. Herbert E. Miles to The Glidden Co.

Improving color of iron stained material. No. 2,214,845. Sidney D. Wells to The Dow Chemical Co.

Dyes, Stains, Etc.

Disazo dyestuffs and their manufacture. No. 2,211,752. Markus Kappeler to Sandoz, Ltd.

Merocyanine dye. No. 2,211,762. Leslie G. S. Brooker, to Eastman Kodak Company.

The benzoylamino-substituted trianthrimidecarbazole vat dyestuff which dyes in bright orange shades from a brown hydrosulfite vat and which exhibits blue color in H_2SO_4. No. 2,212,028. Ralph N. Lulek to E. I. du Pont de Nemours & Co.

Preparation olive to olive gray dyestuffs of the anthraquinone series. No. 2,212,029. Ralph N. Lulek, to E. I. du Pont de Nemours & Co.

As new compounds the conversion products of nitro-monoazo dyestuffs. No. 2,212,590. Detlef Delfs and Richard Stusser to General Aniline & Film Corp.

Process of dyeing mixed fabrics of animal and vegetable fibres with substantive azo dyestuffs. No. 2,212,628. Hermann Winkeler to General Aniline and Film Corp.

Copper complex compounds of polyazo dyestuffs. No. 2,212,816. Carl Theo. Schultis and Hans Schindhelm to General Aniline & Film Corp.

Blue sulfur dyes and methods of manufacturing the same. No. 2,212,-821. Newell M. Bigelow and John Elton Cole to E. I. du Pont de Nemours & Co.

Production of meta-diaza compounds. No. 2,212,928. Erich Berthold and Werner Rohland to General Aniline & Film Corp.

Dyestuffs of the anthraquinone series which dye animal fibers blue shades of good fastness to washing, fulling, seawater and perspiration. No. 2,213,188. Richard Fleischhauer to General Aniline & Film Corp.

Process of producing fast dyeing. No. 2,213,193. Werner Kirst to General Aniline & Film Corp.

Hydroxyalkyl cyanine dye and photographic emulsion. No. 2,213,238. Leslie G. S. Brooker and Lloyd A. Smith to Eastman Kodak Company.

Chromable dyestuffs of the triarylmethane series. No. 2,213,460. Wilhelm Eckert and Karl Schilling to General Aniline & Film Corp.

Acid wool dyestuffs. No. 2,213,608. Heinrich Ritter to General Aniline & Film Corp.

Metallized acid polyazo dyes. No. 2,213,647. Moses L. Cossley and Lincoln M. Shafer to American Cyanamid Co.

A new product for production of dyestuffs, a diazo-amino compound. No. 2,213,655. Haymo V. Pfister to American Cyanamid Co.

Monoazo dyestuffs which dye animal fibers various shades of good fastness when converted on the fiber into corresponding metal compounds. No. 2,213,697. Richard Fleischhauer and Adolf Muller to General Aniline & Film Corp.

Benzothiazinomerocyanine dyes. No. 2,213,730. Bernard Beilsnson to Eastman Kodak Co.

Azo compounds and material colored therewith. No. 2,213,731. Joseph B. Dickey to Eastman Kodak Co.

Azo compounds and material colored therewith. No. 2,213,740. James G. McNally to Joseph B. Dickey to Eastman Kodak Co.

Process improving fastness to wet treatments of substantive dyeings. No. 2,214,067. Siegfried Petersen to General Aniline & Film Corp.

Manufacture of disazo dyes. No. 2,214,337. Georg Matthaeus to General Aniline & Film Corp.

Photographically dye-printed fabrics and method of making same. No. 2,214,365. Oscar R. Flynn and Francis S. Richardson to Waldrich Company.

Process producing metal-phthalocyanine coloring matter. No. 2,214,-477. Albert Riley to Imperial Chemical Industries, Ltd.

Stable solution for producing ice colors. No. 2,214,559. Hans Z. Lecher and Robert P. Parker to American Cyanamid Co.

Azo dyestuffs yielding on vegetable fibers currant to blue shades which change, when after-treated with copper salts, into currant to gray shades of good fastness to light and washing. No. 2,215,087. Hugo Schweitzer to General Aniline & Film Corp.

Coloring matters from azo dyestuffs. The organic amine salt which is the reaction product of the chromium compound of the azo dyestuff 4.6-dinitro-1-hydroxybenzene-azo-2-hydroxynaphthalene-4-sulfonic acid with an aliphatic amine having at least 8 carbon atoms. No. 2,215,105. Hans Krzikalla, to General Aniline & Film Corp.

Color composition, substantially of molecular formula, $4PbO.Sb_2O_5.$-$4TiO_2$. No. 2,215,623. William D. Stillwell to The Harshaw Chemical Co.

Disazo compounds and materials colored therewith. No. 2,215,637. Joseph B. Dickey to Eastman Kodak Co.

Light sensitive diazo-type layers and method of use and production. No. 2,215,739. Werner P. Leuch to Eugene Dietzgen Co.

Acid wool dyestuffs of the quinoxaline series which dye strong reddish brown shades of good fastness to light. No. 2,215,859. Wilhelm Schepss and Otto Bayer to General Aniline & Film Corp.

Equipment and Apparatus

Apparatus for producing alkali silicates. No. 2,211,734. Paul W. Soderberg to J. B. Ford Co.

Apparatus for reclaiming material such as powder or flock. No. 2,211,800. Wayne B. Thompson to Spray Engineering Co.

Apparatus for the treatments of materials in grains or pieces, such as minerals, coals, and the like to remove certain portions. No. 2,211,895. Leon Hoyois.

Oil cracking and polymerizing heater. No. 2,211,903. Laurence J. McCarthy.

Apparatus for refining or catalytic treatment. No. 2,212,043. Robert Pyzel to Universal Oil Prods. Co.

Separation of bodies of different physical properties. No. 2,212,265. Thomas F. Downing, Jr.

Regenerative steam and water mixing device. No. 2,212,288. Harry H. Decker, to The Lathrop-Paulson Company.

Apparatus for treating plastic materials. No. 2,212,494. Barthold De Mattia.

Method retarding fouling of heat exchange operating on relatively high temperature fluid stream and low temperature stream of hydrocarbon material. No. 2,212,581. Burris F. Babin to Pan American Refining Corp.

Reaction chamber for conversion of hydrocarbons. No. 2,212,583. Henry J. Broderson, Henry T. Rogers and Jennings B. Hamblen to Pan American Refining Corp.

Apparatus for mixing gas and liquid. No. 2,212,598. Orbin P. Hagist.

Apparatus for the concentration of acids. No. 2,212,813. Charles L. Jones to Hercules Powder Co.

Pneumatic apparatus for separating powdered materials. No. 2,212,819. Nikolai Ahlmann to F. L. Smidth & Co.

Apparatus for reacting nitric acid and a metal chloride. No. 2,212,835. Arthur Francis Keane and Herman A. Beekhuis, Jr., to The Solvay Process Co.

Apparatus for the aeration of liquids. No. 2,212,841. Frank R. Maxwell to Sun Shipbuilding & Dry Dock Co.

Method of and apparatus for the recovery of heat and chemicals from black liquor. No. 2,213,052. Fay H. Rosencrants and Alexander L. Hamm to Combustion Engineering Co., Inc.

Apparatus for forming substantially spherical shaped agglomerates of flocculent powders. No. 2,213,056. Robert W. Skoog and Thomas J. Bradford to United Carbon Company, Inc.

Foam producing apparatus for fire extinguishers. No. 2,213,122. Ernst Gohre to Concordia Elektrizitats-Aktiengesellschaft.

Alkaline storage battery. No. 2,213,128. Erich Langguth to Accumulatoren-Fabrik Aktiengesellschaft.

Method of and apparatus for disposing of sewage waste. Nos. 2,213,-667-8. William A. Dundas and Philip Harrington.

Process and apparatus for clarifying liquids. No. 2,213,808. George E. G. von Stietz to Shell Development Co.

Apparatus for the concentration of sulfuric acid. No. 2,213,847. Harry Pauling.

Apparatus for measuring rate of precipitation. No. 2,213,888. Paul M. Ross to The Ohio Brass Co.

Reissue. Charcoal production apparatus and process. No. 21,551. Rea Van Anderson.

Molten metal weighing apparatus. No. 2,213,982. Albert A. Frey and Edward J. Parsons.

Heat exchanging device. Joseph M. Gwinn, Jr.

Chlorinating device and lining therefor. Nos. 2,214,611-612. Elmer H. Greenberg.

Apparatus for burning hydrocarbon oils. No. 2,214,670. Jackson G. Gilmore and Milton D. Huston to Columbus Metal Products, Inc.

Method of and apparatus for clay treating. No. 2,214,671. Arthur S. Hagan to Mead Cornell.

Degreasing apparatus and the like. No. 2,214,788. Clarence F. Dinley to Solvent Machine Company.

Process and apparatus for separating gases. No. 2,214,790. Crawford H. Greenewalt to E. I. du Pont de Nemours & Co.

Acetylene generator. No. 2,214,834. Robert J. Kehl and Ralph C. Pierson to Oxweld Acetylene Co.

Apparatus for the manufacture of crystalline bodies. No. 2,214,976. Donald C. Stockbarger to Research Corp.

Apparatus for drying wet granular materials. No. 2,214,981. Gustave Andre Vissac.

Acetylene Generator. No. 2,215,071. Malven Leonard Olson to Oxweld Acetylene Co.

Food preserving apparatus. No. 2,215,123. Milton Kalischer to Westinghouse Electric & Manufacturing Co.

Method and apparatus for distributing liquid solutions. No. 2,215,132. Orrel A. Parker.

Lacquered metal container for foodstuffs. No. 2,215,143. Wm. Clayton to Crosse and Blackwell, Ltd.

Liquid pressure remote control system. No. 2,215,169. John Percival Beeston to Automotive Products Co., Ltd.

Apparatus for producing amorphous forms of normally crystalline salts. No. 2,215,183. Wm. J. Lawrence and Arthur C. Dreshfield to Hercules Powder Co.

Liquid clarifying apparatus. No. 2,215,185. Nels B. Lund (deceased), Florence C. Lund, executrix, to The Dorr Company, Inc.

Heat treatment and heat-treating furnace. No. 2,215,342. John N. Wilson to Frazier-Simplex, Inc.

Stopper for carboys, bottles, cans, and like containers. No. 2,215,392. Wm. Simon Freeman.

Device for pasteurizing liquids. No. 2,215,729. Robert Ruttimann.

Apparatus for the production of rapidly moving ions. No. 2,215,787. Curt Hailer to "Fides" Gesellschaft fur die Verwaltung und Verwertung von gewerblichen Schutzrechten mit beschrankter Haftung.

Means for cooling tuyères or the like. No. 2,215,871. Gordon Fox to Freyn Engineering Co.

Method charging mineral wool furnaces. No. 2,215,887. William R. Seigle, Howard J. O'Brien and George S. Smith to Johns-Manville Corp.

Apparatus for use in dyeing or otherwise processing rayon and similar fibrous materials. No. 2,216,034. Albert Jaeger and Edward M. Trinder to Thies Dyeing Mills, Inc.

Mixing methods and apparatus. Nos. 2,216,088-90. George W. Newton to Crown Cork & Seal Co., Inc.

Explosives

Explosive composition. No. 2,211,737. Earl E. Berkley & George E. Frost to Western Cartridge Co.

In manufacture of blasting explosive method of coating granular inor-

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ganic nitrate. No. 2,211,738. Robert W. Cairns, to Hercules Powder Co.

Explosive and process of manufacture therefore. No. 2,213,255. Fredrich Olsen, Gordon C. Tibbitts and Edward B. W. Kerone to Western Cartridge Co.

Blasting cap containing base charge of pentaerythritoltetranitrate and a priming charge of diazodinitrophenol superimposed thereon. No. 2,214,721. Willard de C. Crater to Hercules Powder Co.

Explosive composition consisting of mixture of potassium perchlorate, manganese dioxide, sodium nitrate, hexamethylenetetramine, sulfur, saccharose and iron filings. No. 2,215,608. Alvaro Hernandes Garcia.

Fine Chemicals

5-sulfonamides of 2-hydroxypyridines. No. 2,211,702. Carl Naegeli, to Cilag, Chemisches Industrielles Laboratorium.

Processes for treating Friedel-crafts reaction liquors. Nos. 2,211,104-5. Harold A. Robinson to The Dow Chemical Co.

Method of refining saccharine liquids. No. 2,211,727. Wm. A. LaLande, Jr., to Porocel Corp.

Quaternary Indole Derivatives and their manufacture. No. 2,211,771. Kurt Engel and Kurt Pfaehler to J. R. Geigy A. G.

Production indigoid compounds. No. 2,211,855. Vaman R. Kokatnur to Autoxygen, Inc.

Process for manufacture new pyridyl phthalic acid derivatives. No. 2,211,948. Isidore Morris Heilbron, Donald H. Hey and John W. Haworth to Chemical Industries, Ltd.

Nuclear alkylated diaminostilbene disulfonic acids and process of making same. No. 2,212,084. Fritz Straub and Herman Schneider to Society of Chemical Ind.

Art of preparing methyl halide derivatives of aromatic hydrocarbons. No. 2,212,099. Franklin D. Jones to American Chemical Paint Co.

Method for the preparation of $\Delta 4$ pregnenol-20-one-3 and intermediates obtained therein. No. 2,212,104. Erwin Schwenk, Bradley Whitman and Gerhard A. Fleischer to Schering Corp.

Preparation of esters comprises reacting an alpha-alkyline sulfide with member of class consisting of halides and anhydrides of organic carboxylic acids. No. 2,212,141. Van V. Alderman & Merlin M. Braubaker to Wm. Ed. Hanford to E. I. du Pont de Nemours & Co.

Preparation of alpha-alkylenimines. No. 2,212,146. Gerard Jean Berchet, to E. I. du Pont de Nemours & Co.

Process of preparing beta-ethylaminoethanols. No. 2,212,149. Merlin M. Brubaker & Robert Wm. Maxwell to E. I. du Pont de Nemours & Co.

Process for preparing organic sulfur compounds. No. 2,212,150. Wm. J. Burke to E. I. du Pont de Nemours & Co.

A polymeric, acyclic, saturated hydrogenated acylion of an open chain dicarboxylic acid. No. 2,212,151. Donald Drake Coffman and Burt F. Faris to E. I. du Pont de Nemours & Co.

Amine-sulfamic acid addition product. No. 2,212,171. Paul L. Salsberg to E. I. du Pont de Nemours & Co.

Process of producing sulfur derivatives of an aromatic compound. No. 2,212,175. James H. Clayton, Bernard Bann to The Manchester.

Compound selected from group consisting of 2-methyl-4,6-dioxo-5-iodo-tetrahydro-pyridine-l-acetic acid and its salts. No. 2,212,187. Otto Schnider, to Hoffman-LaRoche, Inc.

Process of preparing compounds having the character of the male sexual hormones. No. 2,212,363. Max Bockmuhl, Gustav Ehrhart, Heinrich Ruschig & Walter Aumuller, to Winthrop Chemical Co., Inc.

Method preparing primary alkyl catechols. No. 2,212,478. Ellis Miller to Sharp & Dohme, Inc.

Preparation of methylene dialkyl malonates. No. 2,212,506. Gustave Bachman and Howard A. Tanner to Eastman Kodak Co.

Method of esterifying phenolic hydroxyls. No. 2,212,509. Oscar A. Cherry to The Glidden Co.

Chemical substance of formula $(R{-}O{-})_zX\left\{-O-\overset{\overset{O}{\|}}{\underset{\underset{O}{\|}}{S}}-O-\right\}_w Y_v$,

where R is carboxylic acid radical, X is residue of polymer of aliphatic polyhydroxy substance which links the lipophile radical and the sulfate group, Y is a cation and z, w and v are small whole numbers. No. 2,212,521. Benjamin R. Harris to Colgate-Palmolive-Peet Co.

Ethers of durohydroquinone and process of preparing them. No. 2,212,531. Fritz von Werder to Merck & Co., Inc.

Ethers of trimethylhydroquinone and process of preparing them. No. 2,212,532. Fritz von Werder to Merck & Co., Inc.

Amide derivatives of 3,5-dimethyl isoxazole carboxylic acids as medicinal remedy. No. 2,212,767. André Blankart to Hoffmann-La Roche, Inc.

Cysteine sulfinic acid and method of the preparation thereof. No. 2,212,783. Theodore F. Lavine.

Production of sulfonyl chlorides of olefin polymers. No. 2,212,786. David M. McQueen to E. I. du Pont de Nemours & Co.

Nitro-trifluoromethyl-aryl amines and process for making them. No. 2,212,825. Herbert W. Daudt and Harold E. Woodward to E. I. du Pont de Nemours & Co.

Manufacture of stable derivative of adrenaline. No. 2,212,831. Ferdinand Hoffmann and Peter Marquardt to Byke-Guldenwerke Chemische Fabrik A.-G.

Process for the preparation of acyl sulfides and products resulting therefrom. No. 2,212,895. Clyve C. Allen to Shell Development Co.

Process and product relating to the oxidation of unsaturated aldehydes. No. 2,212,900. Herbert P. A. Groll and George Hearne to Shell Development Co.

Aryloxy-polyalkylene ether iodides. No. 2,213,119. Edgar C. Britton, Gerald H. Coleman and John W. Zemba to The Dow Chemical Co.

Manufacture of 1-methyl-4-hydroxy-5-amino and 1-methyl-4-amino-5-hydroxy-naphthalene-1'-sulfonic acid. No. 2,213,194. Hans Lange and Otto Hoffmann to General Aniline & Film Corp.

Catalytic production of arylnaphthyl amines. No. 2,213,204. Paul W. Carlton to E. I. du Pont de Nemours & Co.

Complex mercury-methylxanthine compound. No. 2,213,457. Max Bockmuhl, Leonhard Middendorf and Paul Fritzsche to Winthrop Chemical Co., Inc.

Mono-guanyl compound of formula $H_3C{-}(CH_2)_{11}{-}NH{-}\underset{\underset{NH}{\|}}{C}{-}NH_2$ which melts in form of free base at 96° C. and in form of its hydrobromide at 82° C. No. 2,213,474. Bruno Puetzer to Winthrop Chem. Co., Inc.

A bromo-benzyl morpholine. No. 2,213,469. Marlin T. Leffler to Abbott Laboratories.

Glycol and polyglycol ethers of isocyclic hydroxyl compounds. No. 2,213,477. Adolf Steindorff, Gerhard Balle, Karl Horst, and Richard Michel to General Aniline & Film Corp.

A copper phthalocyanine containing a phenyl group as substituent on each of four benzene nuclei. No. 2,213,517. Berthold Bienert and Sebastian Gassner to General Aniline & Film Corp.

Sodium poly-alkyl phenol sulfonate in which alkyl groups contain more than 4 C atoms. No. 2,213,588. Louis A. Mikeska to Standard Oil Development Co.

An alkyl ester of 3 methoxy-coumaric acid. No. 2,213,717. Louis Piozat and Joseph Lahousse to Societe des Usines Chimiques Rhone-Poulenc.

Compounds of the phthalocyanine series. No. 2,213,726. Max Wyler to Imperial Chemical Industries, Ltd.

Ester of a benzoil benzoic acid and a polyhydroxylic alcohol. No. 2,213,783. Lucas P. Kyrides, to Monsanto Chem. Co.

Diphenylsulfone derivatives and manufacture thereof. No. 2,213,805. Paul Pohls and Fritz Mietzsch to Winthrop Chemical Co., Inc.

Dialkyl ethers of dimethylol urea and process for making same. No. 2,213,921. Ben E. Sorenson to E. I. du Pont de Nemours & Co.

Modification of the physical properties of isocolloids. No. 2,213,943. László Auer to J. R. Newman.

Process for colloidal transformations of organic isocolloids. No. 2,213,944. László Auer to J. R. Newman.

Aqueous solution of cevitamic acid salt, stabilized by use of neutral, water-soluble hypophosphite. No. 2,213,977. Walter G. Christiansen to E. R. Squibb & Sons.

Quaternary ammonium derivatives of alcohol amine compounds. No. 2,213,979. Albert K. Epstein and Morris Katzman to The Emulsol Corp.

Condensation products having the constitution of acid amides and a process of preparing them. No. 2,213,984. Karl Horst and Heinz Schild to General Aniline & Film Corp.

Method reacemization optically active ephedrine compound. No. 2,214,034. Donalee L. Tabern to Abbott Laboratories.

Process of making mono-sodium glutamate from gluten. No. 2,214,115. J. Paul Bishop and Floyd L. Tucker to Corn Products Refining Co.

Process reacting diketone with benzene in presence of Al Cl_3. No. 2,214,117. Albert B. Boese, Jr., to Carbide and Carbon Chemicals Corp.

Method for reacting higher alcohols with sulfating agents. No. 2,214,254. Victor Mills and Richard C. Wood to The Procter & Gamble Co.

Basic methyl mercury nitrate. No. 2,214,278. Heinrich Klos to Winthrop Chem Co., Inc.

Process for manufacturing halogenated phthalocyanines. No. 2,214,469. Reginald P. Linstead and Charles E. Dent to Imperial Chemical Industries, Ltd.

Alkali metal salts of the acetaldehyde bisulfite compound of sulfanilamide. No. 2,214,527. Arthur G. Green and Myer Coplans.

Method for the preparation of a catalyst for oxidation reactions. No. 2,214,930. Edwin R. Littmann to Hercules Powder Company.

Cyano and thiocyano compounds and a process for their manufacture. No. 2,214,971. Paul Müller to J. R. Geigy.

Aminohydroxy compounds and derivatives and process of making the same. No. 2,215,038. Theodore S. Hodgins and Almon G. Hovey to Reichhold Chemicals, Inc.

Production of esters of double unsaturated alcohols. No. 2,215,180. Felix Kaufler, to Dr. Alexander Wacker, Gesellschaft fur Elektrochemische Industrie.

Preparation of glycol acrylates. No. 2,215,219. Elmer H. Haux to Pittsburgh Plate Glass Co.

Iron compound of nucleotides and their organic hydrolytic decomposition products and method of making same. No. 2,215,233. Simon L. Ruskin.

Method regenerating synthetic gel catalysts. No. 2,215,304. Alexis Voorhies, Jr., to Standard Oil Development Co.

Process for reactivating synthetic oxide gel catalysts. No. 2,215,305. Alexis Voorhies, Jr., to Standard Oil Development Co.

Condensation products of acid amide-like constitution and process of preparing them. No. 2,215,367. Gerhard Balle and Heinz Schild to I. G. Farbenindustrie Aktiengesellschaft.

Process for the manufacture of synthetic alphatocopherol. No. 2,215,398. Paul Karrer to Hoffmann-LaRoche, Inc.

Neutral calcium lead-gluconate, being a white powder, containing about 17% of lead being soluble in water with about neutral reaction. No. 2,215,429. Hans Schmidt and Heinrich Jung to Winthrop Chemical Co., Inc.

Aromatic sulfonamide-substituted antimony compounds. No. 2,215,430. Hans Schmidt to Winthrop Chemical Co., Inc.

Process for absorbing nitrosyl chloride. No. 2,215,451. Herman A. Beekhuis, Jr., to The Solvay Process Co.

Aromatic mercury sulfonates and process of making them. No. 2,215,457. Carl N. Anderson to Lever Bros. Co.

Process for conversion to oxidized form of a leuco compound which requires to lose hydrogen for such conversion. Nos. 2,215,555-556. Geoffrey Lord and George Reeves to Celanese Corp. of America.

Dialkoxy substituted glycols and process for preparing same. No. 2,215,583. Joseph Heckmaier and Felix Kaufler to Alexander Wacker Gesellschaft fur Elektrochemische Industrie, G. m. b. H.

Process of recovery of pregnandiol. No. 2,215,628. Paul Weil to The Chemical Foundation, Inc.

Process producing alkali metal peroxides comprising oxidizing solution of corresponding alkali and of an autoxidizable organic compound which yields peroxide upon oxidation in alkaline solution in a solvent in which alkali metal peroxide is practically insoluble. No. 2,215,856. Georg Pfleiderer to Walter H. Duisberg.

Process for manufacture of 2-substituted imidazolines. Nos. 2,215,861-864. Edmund Waldmann and August Chwala to General Aniline & Film Corp.

Recovery of concentrated alkylene chlorhydrins. No. 2,215,865. Walter Ziese to General Aniline & Film Corp.

Process for producing hydrogen peroxide by autoxidation of dissolved organic compounds. No. 2,215,883. Hans-Joachim Riedl and Georg Pfleiderer to Walter H. Duisberg.

Method recovering cobalt values from catalysts prepared by precipitating compounds of cobalt onto kieselguhr. No. 2,215,883. Hans-Joachim Riedl and Georg Pfleiderer to Walter H. Duisberg.

Aliphatic-sulfonate salts of therapeutically active bases. No. 2,215,940. Horace A. Shonle to Eli Lilly & Co.

Metal salts of 12-ketostearic acid. No. 2,215,955. Henry L. Cox to Union Carbide and Carbon Corp.

Method for continuously recovering phthalic anhydride from dilute vapor mixture thereof obtained by catalytic air oxidation of naphthalene. No. 2,215,968. John W. Livingston to Monsanto Chem. Co.

Process for the production of hydrindene and alpha-and beta-truxene. No. 2,215.001. Ewald Dietzel to Rutgerswerke-Aktiengesellschaft.

A water soluble ether of a-cellulose and an aliphatic monohydric alcohol

containing less than 3 carbon atoms in which there are from 0.6 to 1.0 alkoxy groups to each $C_6H_{10}O_5$ units. No. 2,216,045. Donald H. Powers, Louis H. Bock and Alva L. Houk to Rohm & Haas Co.

Industrial Chemicals

Process of producing alkali silicates. No. 2,211,733. Paul W. Soderberg to J. B. Ford Co.

Compound of aluminum hydroxide and process of making the same. No. 2,211,745. Kennard F. Stephenson to Alba Pharmaceutical Co., Inc.

Process and apparatus for the production of composition of lead and its oxides and compositions of related products. No. 2,211,775. Charles F. Haunz to The Richardson Co.

Preparation cyclopropane comprising reacting trimethylene dihalide with metal reduction agent in presence of dissolved salt of a metal displaceable by metal reduction agent. No. 2,211,787. Wm. A. Lott to E. R. Squibb & Sons.

Process making $CaCo_3$ of fine particle size. No. 2,211,796. Kurt Schneider.

Method preparing anhydrous aluminum sulfate. No. 2,211,805. Wm. S. Wilson and Neil A. Sargent to Monsanto Chemical Co.

Method recovering sodium hydroxide and producing fine grained calcium carbonate from spent digestion liquor of paper pulp industry. No. 2,211,908. James J. O'Connor to The Mead Corp.

Process producing organic sulfur compounds from gas containing ethylene, higher homologs of ethylene and hydrogen sulfide. No. 2,211,990. Bernard H. Shoemaker and Howard R. Batchelder to Standard Oil Co., corp. of Indiana.

Production of naphthalene from aliphatic hydrocarbons having 10 C atoms in straight-chain arrangement. No. 2,212,018. Aristid V. Grosse and Wm. J. Mattox to Universal Oil Products Co.

Conversion of aliphatic hydrocarbons to cyclic hydrocarbons. No. 2,212,112. Justic F. Clausen to Shell Development Co.

Process of fractionating fatty acids. No. 2,212,127. Ralph H. Potts and John E. McKee to Armour & Co.

Production of nitric acid. No. 2,212,135. Nicolay Titlestad & Arthur C. Bright to Chemical Construction Corp.

Process for polymerizing ethylene. No. 2,212,155. Linus M. Ellis to E. I. du Pont de Nemours & Co.

Process of calcining comminuted limestone. No. 2,212,446. Walter H. MacIntire to American Zinc, Lead & Smelting Co.

Apparatus for producing carbon black. Cecil G. Keeton, deceased, by Lillian Keeton, administratrix, to Danciger Oil and Refineries, Inc.

Process for the production of acetaldehyde from acetylene by catalytic hydration. No. 2,212,593. Egbert Dittrich to Chemical Marketing Co.

Process for preparing quaternary ammonium compounds and intermediates therefor. No. 2,212,654. Walter V. Wirth and Robert F. Deese, Jr., to E. I. du Pont de Nemours & Co.

A solvent composition. No. 2,212,761. Hugh G. Webster to Kolene Corp.

Azeotropic distillation for removing cyclohexane from admixture with other substances comprises treating mixture with acetone and distilling off resultant cyclohexane-acetone azeotrope. No. 2,212,810. Edmund Field to E. I. du Pont de Nemours & Co.

Process for the recovery and reutilization of ammonia and carbon dioxide in urea synthesis. No. 2,212,847. Frank Porter to The Solvay Process Co.

Process reacting aluminum chloride in presence of compound from group consisting of sulfur dioxide and alkali bisulfide with secondary aromatic amines. No. 2,212,965. Franz Wieners and Walter Mieg to General Aniline & Film Corp.

A process for purifying the calcium hydroxide masses obtained in preparation of acetylene from CaC_2. No. 2,213,131. Karl Wintersberger and Walter Spormann to I. G. Farbenindustrie Aktiengesellschaft.

Method of precipitation in formation of solids from reacting liquids step comprising forcing a solution of one of reactants by means of a jet nozzle about 40 ft./sec. through body of gas into body of other reacting liquid. No. 2,213,211. Raymond H. Fleckenstein and Albert T. Mertes to E. I. du Pont de Nemours Co.

Recovery of acetylene-containing gases free from carbon black and hydrocyanic acid. No. 2,213,267. Paul Baumann and Heinrich Schilling to Jasco, Inc.

Process for reducing sulfide sulfur evaluation of sulfur bearing compounds contained in paper mill waste liquors. No. 2,213,330. Oscar W. Wahlstrom.

Method and apparatus for fractionating gaseous mixtures. No. 2,213,-338. William L. DeBaufre.

Process producing mixtures of hydrocarbons comprising subjecting composition consisting of CH_4, at least one member of group constituted by CO and CO_2 and at least one member of group constituted by H_2 and H_2O at temp. 225-380° C. to pres. of >500 atms. No. 2,213,415. Eulampiu Slatineanu to Gewerkschaft Auguste.

Methods for preparing lead cyanamide. Nos. 2,213,440-441. Kenneth D. Ashley and Cyril B. Clark to American Cyanamid Co.

Cyclic process for the production of nitroparaffins. No. 2,213,444. Kenneth Johnson to Commercial Solvents Corp.

Means for freeing coke from the metallic walls of coke ovens and other carbonizing chambers. No. 2,213,533. Franz Puening.

Manufacture of chemically pure hydrochloric acid. No. 2,213,544. James W. Brown and Hallock C. Hosford to E. I. du Pont de Nemours & Co.

Process for removing sulfuric acid from hydrochloric acid-containing gas. No. 2,213,556. Otho L. Thomas to E. I. du Pont de Nemours & Co.

Method of recovering sugar crystals from solution. No. 2,213,710. August Ludwig and Calvin L. Swihart.

Denatured alcohol containing a primary amine and chloroform. No. 2,213,760. Louis J. Figg, Jr., to Eastman Kodak Co.

Method of plodding soap. No. 2,213,772. Bruce Strain to The Procter & Gamble Co.

Process for the recovery of elementary sulfur from sulfur dioxide and gases containing same. No. 2,213,787. Conway B. von Girsewald, Gerhard Roesner and Josef Barwasser to American Lurgi Corp.

Process for production of solids from a body of a reactive liquor and a body of a reactive solid in suspension. No. 2,213,907. Raymond H. Fleckenstein and Albert T. Mertes to E. I. du Pont de Nemours & Co.

Catalytic process for polymerizing fatty oils. No. 2,213,935. Samuel O. Sorensen and James C. Konen to Archer-Daniels-Midland Co.

Method of the preparation of terpene derivatives. No. 2,214,039. Joseph N. Borglin to Hercules Powder Co.

Process for the production of urea from ammonia and carbon dioxide containing inerts. No. 2,214,068. Donald A. Rogers and Frank Porter to The Solvay Process Co.

Method for purification of ethyl cellulose. No. 2,214,070. Harold M. Spurlin to Hercules Powder Co.

Process separating K Cl from Na Cl of potash ore by hindered settling separation. No. 2,214,206. John P. Rasor to Pacific Coast Borax Co.

Process treating solution of mixed alum obtained by digesting calcined alunite with H_2SO_4 and adding K_2SO_4 to produce essentially potassium alum, so that alum may be subsequently either completely dehydrated or disulfurized without fusion. No. 2,214,214. John H. Walthall.

Process for manufacturing sugar. No. 2,214,281. Roy L. Lay 1-3 to Walter J. Kellogg and 1-3 to I. W. Reed.

Process for the production of condensation products containing onium groups. No. 2,214,352. Conrad Schoeller, Heinrich Ulrich and Ernst Ploetz to General Aniline & Film Corp.

Process for making chromite refractory materials. No. 2,214,353. Gilbert E. Seil, to E. J. Lavino and Co.

Process for purifying naphthenic acids. No. 2,214,438. Raymond C. Rich and Curtis W. Cannon, to Shell Development Co.

Method removing lecithin from oil and solvent mixtures containing same comprises contacting with adsorbent tricalcium phosphate. No. 2,214,520. Thomas M. Beck and George I. Klein to Victor Chemical Works.

Methods manufacturing cement clinker. Nos. 2,214,715-717. Charles H. Breerwood to Separation Process Co.

Process and reagent for resolving emulsions. No. 2,214,783. Truman B. Wayne.

Process and reagent for resolving emulsions. No. 2,214,784. Truman B. Wayne.

Process for production of hydrogen sulfide. No. 2,214,859. Aylmer H. Maude and John D. Sweeney to Hooker Electrochemical Company.

Process for the extraction of fibers from fiber-containing materials. No. 2,214,893. Georg M. von Hassel.

Treatment of distillery slop and other waste liquids. No. 2,214,909. Ernest E. Pittman and Robert Roger Bottoms to The Girdler Corp.

Method for the production of maleic anhydride. No. 2,215,070. John Z. Miller to Hercules Powder Co.

Production of maleic acid. No. 2,215,095. Otto Drossbach to General Aniline & Film Corp.

Process distilling glycerol from crude solution thereof. No. 2,215,189. Ralph F. Peterson to E. I. du Pont de Nemours & Co.

Composition of matter comprising styrene having dissolved therein a hydrocarbon gas selected from group consisting of propane, propylene, isobutane, butylene in portion to inhibit polymerization. No. 2,215,255. Sylvia M. Stoesser and Ray H. Boundy to The Dow Chemical Co.

Method roasting ferrous sulfate and obtaining therefrom sulfuric acid and iron oxide. No. 2,215,394. Ingenuin Hechenbleikner & Nicolay Titlestad to Chemical Construction Corp.

Process for the production of a nitrate. No. 2,215,450. Herman A. Beekhuis, Jr., to The Solvay Process Co.

Process for oxidation of hydrocarbons. No. 2,215,472. William H. King and Clyde Quitman.

Process for controlling vapor phase hydrocarbon reactions. No. 2,215,-498. Charles S. Fazel to The Solvay Process Company.

Method separating styrene from mixtures containing styrene and a-alkyl styrenes. No. 2,215,569. Herbert M. Stanley and John B. Dymock.

Process of removing impurities from vegetable oils. No. 2,215,624. George J. Strezyniski to The DeLaval Separator Co.

Sterol compounds and methods of producing them. No. 2,215,727. Hans R. Rosenberg and John M. Tinker to E. I. du Pont de Nemours & Co.

Method of making lead zirconium silicate. No. 2,215,737. Charles J. Kinzie to The Titanium Alloy Mfg. Co.

Process of purifying gases containing sulfur compounds as impurities. No. 2,215,754. Alvah J. W. Headlee.

Method of producing hydrated calcium silicate minerals and products thereof. No. 2,215,891. George M. Thomson and Zoltan Erdeley to Gypsum Lime and Alabastine, Canada, Ltd.

In process producing olefine by thermally decomposing a sulfur-bearing hydrocarbon at temp. above 600° C. while in contact with heat-resistant chromium alloy, step of forming protective coating on said chromium alloy. No. 2,215,950. Howard S. Young to E. I. du Pont de Nemours & Co.

Process obtaining hydrated magnesia in easily filterable form. No. 2,215,966. Harley C. Lee and Elizabeth K. Lee to Basic Dolomite, Inc.

Method clarifying liquids containing sulfur particles of such finess as to be normally unfilterable therefrom. No. 2,215,969. Alfred Maxton to North American Rayon Corp.

Processes of manufacturing carbureted water gas. Nos. 2,216,055-056. William E. Steinwedell to The Gas Machinery Co.

Metals, Alloys

Metallic alloy composed of .6-.9% Cr, .3-.6% Zr, and balance Al. No. 2,211,764. Henry L. Coles to William Sokolec.

Alloy containing copper, chromium, silicon and magnesium. No. 2,212,-017. James Fletcher.

Process improving strength characteristics of magnesium base alloys containing zirconium. No. 2,212,130. Franz Sauerwald to Magnesium Development Corp.

Alloy suitable for use as bearing metals. No. 2,212,178. Paul Kemp.

An alloy steel. No. 2,212,228. Ralph P. deVries to Allegheny Ludlum Steel Corp.

Copper alloy containing small amounts of silver, cobalt and beryllium. No. 2,212,254. Louis L. Stott, to The Beryllium Corp.

Corrosion resistant alloy of aluminum and chromium. No. 2,212,266. Henry L. Coles to Wm. Sokolec.

Process recovering substantially pure nickel from iron oxide ores containing relatively small amounts of nickel oxide. No. 2,212,459. Kenneth M. Simpson.

A machine to recover fine particles of gold, silver, platinum, lead or other metals from an aqueous mineral-bearing pulp or slime. No. 2,212,-467. Maurice Constant.

Method of making copper-lead bearings. No. 2,212,473. Werner Hessenbruch & Wilhelm Rohn.

Alloy steels. Nos. 2,212,494-6. Ralph P. De Vries, to Allegheny Ludlum Steel Corp.

Method of producing metals such as calcium and magnesium. No. 2,213,170. John S. Peake and Charles E. Nelson to The Dow Chemical Co.

Process removing bismuth from lead. No. 2,213,197. Jesse O. Betterton and Yurii E. Lebedeff to American Smelting and Refining Co.

Age hardenable nickel alloys possessing hot workability. No. 2,213,198. Clarence G. Bieber and Mortimer P. Muck to The International Nickel Co., Inc.

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Centrifugally cast form of alloys. Nos. 2,213-207-8. Anthony G. deGolyer.
Process of coating metals. No. 2,213,263. John S. Thompson and Herbert K. Ward to The Patents Corp.
Apparatus for the production of powder of low-melting point metals or of compounds thereof. No. 2,213,365. Siegfried Hiller.
Method forming improved contact alloy composed of palladium and copper. No. 2,213,397. Edwin F. Kingsbury and Howard T. Reeve to Bell Telephone Labs. Inc.
Sintered agglomerated powder of alloy of iron and carbon bonded by iron-phosphorous eutectic. No. 2,213,523. William D. Jones and Edward J. Groom.
Recovery of copper from scrap brass. No. 2,213,864. Allen C. Jephson to Lincoln Niagara Corp.
Process coating a base metal with a protective metal. No. 2,213,952. Ralph K. Clifford to Continental Steel Corp.
Porous metal article for use in bearings and like consisting of porous matrix of sintered iron powder coated with soft metal which is insoluble in iron, said matrix containing up to 2% graphite. No. 2,214,104. John M. Hildabolt and Arthur R. Shaw to General Motors Corp.
Alloy containing nickel, chromium, molybdenum, copper, silicon, manganese, carbon, sulfur, phosphorous and iron. No. 2,214,128. Marselio G. Fontana to E. I. du Pont de Nemours & Co.
Copper-silicon-iron alloy. No. 2,214,149. Allan U. Seybolt to Electro Metallurgical Co.
Process for producing zirconium metal. No. 2,214,211. Helmut von Zeppelin and Ludwig Teichmann to Walther H. Duisberg.
Aluminum-copper-nickel-magnesium alloy containing iron and columbium. No. 2,214,431. Alfred J. Murphy, Stanley A. E. Wells to Electro Metallurgical Co.
Aluminum alloy containing copper, iron and columbium. No. 2,214,532. Alfred J. Murphy and Stanley A. E. Wells to Electro Metallurgical Co.
Aluminum alloy containing copper, silicon, iron and columbium. No. 2,214,433. Alfred J. Murphy and Stanley A. E. Wells to Electro Metallurgical Co.
Method producing magnesium by thermal reduction of magnesia-containing materials. No. 2,214,557. Roy C. Kirk to The Dow Chemical Co.
Products for fixing tanning agents and a method of carrying out this fixing. No. 2,214,629. Arthur Voss and Walter Pense to General Aniline & Film Corp.
Iron alloy. No. 2,214,652. Richard H. Bancroft to The Perfect Circle Company.
Apparatus for treating metals or metallic articles. No. 2,214,681. Howard E. Somes.
Reissue. Process of concentrating ores. No. 21,566. Leslie D. Anderson to Potash Company of Amer.
Process for recovering silver from photographic solutions. No. 2,214,-765. Charles Holzwarth to du Pont Film Manufacturing Corp.
Alloy consisting of cobalt, chromium, tungsten, carbon, boron and titanium. No. 2,214,810. Percy C. Chesterfield.
Cathode for electron discharge devices consisting of rhenium and up to 10% of thorium. No. 2,214,902. Felix Harriger to C. Lorenz Aktiengesellschaft.
Method desulfurizing gas suitable to serve as atmosphere for bright heat treatment of metals. No. 2,214,926. Rubert G. Guthrie & Oscar J. Wilbor to Peoples Gas By-Products Corp.
Preventing corrosion of ferrous metals. No. 2,215,077. Herman A. Beekhuis, Jr., and Wm. De Forest Macomber to The Solvay Process Company.
Preventing corrosion of ferrous metals. No. 2,215,092. Herman A. Beekhuis, Jr., and Wm. De Forest Macomber to The Solvay Process Co.
Electrolytic process coating interior of metal container. No. 2,215,144. Wm. Clayton, Robert Ian Johnson and Cyril Gordon Sumner to Crosse & Blackwell, Ltd.
Process for treating tin-plate containers. No. 2,215,165. Cyril Gordon Sumner to Crosse & Blackwell, Ltd.
Method for coating metal for foodstuff containers. No. 2,215,166. Cyril Gordon Sumner, Robert Ian Johnson and Wm. Clayton to Crosse & Blackwell, Ltd.
Process of protecting metal surfaces by electrode-position. No. 2,215,-167. Cyril Gordon Sumner, Robert Ian Johnson and Wm. Clayton to Crosse & Blackwell, Ltd.
Aluminum alloys as bering metals. Nos. 2,215,442-443-444-445. Eugen Vaders to Vereinigte Deutsch Metallwerke Aktiengesellschaft.
Age hardenable alloy containing cobalt, iron and chromium with less than .05% carbon. No. 2,215,459. Robert H. Canfield, Herman F. Kaiser, Roy A. Gezelius and Henry S. Jerabek.
Process for decarburizing metals. No. 2,215,588. Augustus B. Kinzel to Electro Metallurgical Co.
Method treating tungsten ingots to improve quality of wire drawn therefrom. No. 2,215,645. Charles V. Iredell and Thomas J. Hankins to Westinghouse Electric & Mfg. Co.
An austenitic steel. No. 2,215,734. Oscar E. Harder to Inland Steel Co.
Alloy cast iron. No. 2,215,740. Clarence H. Lorig to Battelle Memorial Institute.
Method recovering zinc from dross by distillation. No. 2,215,961. Edgar A. Hawk to W. J. Bullock, Inc.

Paper and Pulp

Paper sizing. No. 2,214,018. Lowell O. Gill to A. E. Staley Mfg. Co.
Coated papers and methods of making the same. Nos. 2,214,564-566. William J. Montgomery and Donald B. Bradner to Champion Paper and Fibre Co.
Process and apparatus for coating paper. No. 2,214,772. Gerald D. Muggleton to Consolidated Water Power & Paper Co.
Manufacture of wet-strengthened paper. No. 2,215,136. Milton O. Schur to Brown Company.
Method manufacturing paper. No. 2,215,328. Melvin L. Kemp.

Petroleum

Combination polymerization and alkylation of hydrocarbons. No. 2,211,-747. Arthur R. Goldsby and Claude W. Watson to The Texas Co.
Combination, with highly refined viscous petroleum oil, of material selected from the class of disulfides in quantity sufficient to diminish production of acidic compounds. No. 2,211,798. Bertrand W. Story and Everett W. Fuller to Socony-Vacuum Oil Co., Inc.
Process converting lubricating oils of high viscosity and high viscosity index to oils of lower viscosity and substantially same viscosity index. No. 2,211,944. Chester E. Andrews and Merrell R. Fenske to Rohm & Haas Co.
Process for pyrolytic conversion of hydrocarbon oils. No. 2,211,999. Joseph G. Alther to Universal Oil Prods. Co.
Conversion process for hydrocarbon oils. No. 2,212,023. Lyman C. Huff to Universal Oil Prods. Co.
Process converting aliphatic hydrocarbons having at least 6 C. atoms in straight chain arrangement into cyclic hydrocarbons. No. 2,212,026. Vasili Komarewsky to Universal Oil Products Co.
Fluid heating apparatus. No. 2,212,030. Lev A. Mekler, to Universal Oil Prods. Co.
Catalytic dehydrogenation of hydrocarbons. No. 2,212,034. Jacque C. Morrell and Aristid V. Grosse to Universal Oil Prods, Co.
Production aromatic hydrocarbons from aliphatic hydrocarbons of at least 6 C. atoms in straight chain arrangement. No. 2,212,035. Jacque C. Morrell & Aristid V. Grosse, to Universal Oil Prods. Co.
Processes for removing acid components from hydrocarbon distillates. Nos. 2,212,105-107. David Louis Yabroff to Shell Development Co.
Recovery of liquid hydrocarbons from distillate wells. No. 2,212,143. George S. Bays to Stanolind Oil & Gas Co.
Art of cracking hydrocarbons. No. 2,212,565. Orin G. Kaasa to Sinclair Refining Co.
Polymerization of unsaturated aldehydes. No. 2,212,894. Clyve C. Allen to Shell Development Co.
Catalytic condensation of low-boiling hydrocarbons. No. 2,212,951. Roderick D. Pinkerton and William Mendius to Sinclair Refining Co.
Improvement in catalytic condensation of normally gaseous hydrocarbons to produce liquid hydrocarbons of gasoline boiling range. No. 2,212,952. Roderick D. Pinkerton and William Mendius to Sinclair Refining Co.
Antiknock fuel. No. 2,212,992. Frank J. Sowa to International Engineering Corp.
Process treating hydrocarbons to produce motor fuels which comprises separating a paraffinic naphtha fraction into a relatively light and relatively heavy naphtha fraction. No. 2,213,114. Harold V. Atwell to Process Management Co., Inc.
Continuous process for producing polymer gasoline from gaseous hydrocarbons. No. 2,213,247. Eugene J. Houdry to Houdry Process Corp.
Process of producing high anti-knock motor fuel. No. 2,213,345. Robert F. Marschner to Standard Oil Co., Chicago, Ill.
Arrangement for producing oil from substance formation. No. 2,213,372. Riley A. Aucoin to Standard Oil Development Co.
Process making difficultly ignitable Diesel power fuels more readily ignitable. No. 2,213,407. Theodor W. Pfirrmann to Friedrich Uhde.
Removal of asphalt from hydrocarbon oils. No. 2,213,798. Charles T. Anné to The Texas Co.
In regenerative process for separating mercaptans from hydrocarbon distillate containing both mercaptans and alkyl phenols, method of controlling composition. No. 2,213,801. Boris A. Frolov to Shell Development Co.
Methods for geochemical prospecting. Nos. 2,213,904-5. Joseph B. Clark to Stanolind Oil and Gas Co.
Process countercurrently extracting mineral oil with selective solvent. No. 21,556. Merrell R. Fenske and Wilbert B. McCluer to Pennsylvania Petroleum Research Corp.
Process recovering gasoline constituents from gases occurring in high pressure well of gas distillate type. No. 2,213,996. Oscar L. Roberts to The Atlantic Refining Co.
Purification of oil soluble sulfonate. No. 2,214,037. Francis M. Archibald to Standard Oil Development Co.
Apparatus for producing oil from formation containing both oil and water. No. 2,214,064. Joseph A. Niles to Stanolind Oil and Gas Go.
Solvent refining of mineral oil. No. 2,214,282. Robert E. Manley and Bernard Y. McCarty to The Texas Co.
Method of removing paraffin wax from wells. No. 2,214,363. Martin de Simo, Howard C. Lawton and Albert G. Loomis to Shell Development Co.
Drilling fluid composition. No. 2,214,366. John W. Freeland and Harold T. Byck to Shell Development Co.
Continuous multistage process for recovery of liquids from mixtures of materials having different boiling points. No. 2,214,368. Bernard S. Greensfelder and Louis R. Goldsmith to Shell Development Co.
Method plugging formation in wells. No. 2,214,423. Wm. Bruce Lerch and Eugene J. Gatchell to Phillips Petroleum Co.
Multistage catalytic conversion of hydrocarbons. No. 2,214,455. Gustav Egloff and Charles L. Thomas to Universal Oil Products Co.
Process obtaining valuable products from butene trimers under conditions conducive to formation of octanes by depolymerization and hydrogenation of said trimers. No. 2,214,463. Vladimir Ipatieff and Raymond E. Schadd to Universal Oil Products Co.
Alkylation of paraffin hydrocarbons. No. 2,214,481. Louis Schmerling and Herman Pines to Universal Oil Products Co.
Process for the recovery of desirable constituents from gas. No. 2,214,-678. Paul M. Raigorodsky to Petroleum Engineering, Inc.
Engine fuel. No. 2,214,768. Bert H. Lincoln to The Lubri-Zol Development Corp.
Production motor fuel from gases containing gaseous olefins of from 2 to 4 C. atoms per molecule. No. 2,215,062. Harold V. Atwell to Process Management Co., Inc.
Method solvent extracting a mineral oil in a vertical packed tower. No. 2,215,359. Myran J. Livingston, Henry O. Forrest and Percy C. Keith, Jr., to Standard Oil Co., corp. of Indiana.
Process decolorizing viscous lubricating oil. No. 2,215,362. Jack Robinson, to Standard Oil Co., corp. of Indiana.
Process revivification solid catalyst mass which is deposited on coke-like material. No. 2,215,868. John W. Bertetti to Pan American Refining Corp.
Process of selectively refining petroleum oils, containing paraffinic and naphthenic constituents. No. 2,216,009. Arthur W. Hixson and Ralph Miller to The Chemical Foundation, Inc.
Method of removing sulfur impurities from petroleum oils. No. 2,216,-027. William A. Smith.

Pigments

Method preparing titanium dioxide pigments. No. 2,211,828. Franklin L. Kingsbury and Charles L. Schmidt to National Lead Co.
Method of preparing composite pigments. No. 2,212,629. Hugh V. Alessandroni to National Lead Co.
Process dispersing pigments in liquid organic vehicle. No. 2,212,641. Robert T. Hucks to E. I. du Pont de Nemours & Co.
Process rendering colored pigment stable and resistant towards litho-

graphic breakdown. No. 2,212,917. Samuel G. Hornig to E. I. du Pont de Nemours & Co.
Production of phthalocyanine pigments. No. 2,212,924. Fritz Muehlbauer to General Aniline & Film Corp.
Process for producing non-reactive, calcined, stable, weather-resistant titanium oxide substantially free from soluble salts. No. 2,212,935. Marion L. Hanahan and Robert M. McKinney to E. I. du Pont de Nemours & Co.
Water-soluble, maroon-colored pigment, the combination of 3-nitro-4-amino-anisol with the meta-nitranilide of 2-hydroxy-3 naphthoic acid. No. 2,212,956. Alfred Siegel to E. I. du Pont de Nemours & Co.
Process forming readily dispersible but substantially dustless carbon black particles. No. 2,213,059. Harold L. Teegerstrom to United Carbon Co., Inc.
Composite pigments and process of making same. No. 2,213,168. Reginald H. Monk and Archibald S. Ross to American Zinc, Lead and Smelting Co.
Process producing stable, weather-resistant rutile titanium dioxide pigment. No. 2,213,542. James E. Booge to E. I. du Pont de Nemours & Co.
Pigment composition containing lead cyanamide, said pigment being of high tinctorial strength and opacity and adapted to impart corrosion-resistant characteristics to coating compositions. No. 2,213,546. Charles Dangelmajer to E. I. du Pont de Nemours & Co.
Process for producing calcium sulfate-zinc sulfide pigments. No. 2,213,555. Roy W. Sullivan to E. I. du Pont de Nemours & Co.
Pigment preparation comprising coloring matter of the phthalocyanine series and water soluble salt of condensation product of naphthalene-sulfonic acid and formaldehyde. No. 2,213,693. John S. H. Davies, Anthony J. Hailwood and William Todd to Imperial Chemical Industries, Ltd.
Production of titanium oxide pigments having blue tint. No. 2,214,132. Charles R. Hager to E. I. du Pont de Nemours & Co.
Manufacture of finely divided phthalocyanine pgiments. No. 2,214,454. Charles E. Dend to Imperial Chemical Industries, Ltd.
Improved pigment milling process for titanium oxide material. No. 2,214,815. Marion L. Hanahan and James D. Prince to E. I. du Pont de Nemours & Co.
Alcoholic and ketonic suspensions of titanium pigments. No. 2,215,857. Walter W. Plechner and Joseph M. Jarmus to National Lead Co.
Manufacture of purified pigmentary alkaline earth metal sulfates. No. 2,215,866. Hugh V. Alessandroni to National Lead Co.
Pigment conditioner. No. 2,215,912. Orla R. Plummer.

Resins, Plastics, Etc.

Triazine-aldehyde resinous condensation products. No. 2,211,709. Werner Zerweck and Karl Keller to I. G. Farbenindustrie Aktiengesellschaft.
Diazina-aldehyde resinous condensation products. No. 2,211,710. Werner Zerweck and Karl Keller to I. G. Farbenindustrie Aktiengesellschaft.
Method curling piece of thermoplastic material. No. 2,211,744. Christian B. Nelson & Isidore Spinner to Plastic Binding Corp.
Process of producing maleic anhydride-glycerine-rosin resin. No. 2,211,913. Patrick J. Ryan and Almon G. Hovey to Reichhold Chemicals, Inc.
Method producing oil acid-modified alkyd resins. No. 2,211,938. Israel Rosenblum.
Composition of matter comprising copolymer of styrene and as plasticizing agent therefor, a di-(Halophenyl-)alkane. No. 2,213.201. Edgar C. Britton and Gerald H. Coleman to The Dow Chemical Co.
Production synthetic resin comprises treating liquid isobutylene with boron fluoride at low temp. to obtain plastic resin and then treating said resin with chlorine. No. 2,213,331. Maurice H. Arveson to Standard Oil Co., Chicago.
Thermosetting molding compositions comprising formaldehyde-urea reaction products. Nos. 2,213,577-8. David E. Cordier to Plaskon Co., Inc.
Polyvinyl acetal resins. No. 2,213,750. Donald R. Swan to Eastman Kodak Co.
Polyvinyl acetal resin sheet containing benzyl maleate. No. 2,213,751. Donald R. Swan to Eastman Kodak Company.
Polyvinyl acetal resin sheets containing a tetrahydrofurfuryl ester of phthalic acid. No. 2,213,752. Donald R. Swan to Eastman Kodak Co.
Polyvinyl acetal resin composition containing acyl amides. No. 2,213,763. Jack J. Gordon to Eastman Kodak Co.
Polyvinyl acetal resin compositions containing trimethylene glycol ditetrahydrofuroate. No. 2,213,771. Henry B. Smith to Eastman Kodak Co.
Molded article of alcohol soluble vegetable protein and method of producing same. No. 2,214,140. Charles H. Lubb to Corn Products Refining Co.
Composition of matter comprising synthetic linear polyamide and a phenol. No. 2,214,402. Wallace Hume Carothers, to E. I. du Pont de Nemours & Co.
Plasticized synthetic linear polyamide composition. No. 2,214,405. Donald D. Coffman to E. I. du Pont de Nemours & Company.
Method decreasing thermal decomposition during manufacture of shaped articles from molten synthetic fiber-forming polyamide. No. 2,214,442. Edgar Wm. Spanagel to E. I. du Pont de Nemours & Co.
Process producing light colored, solid, synthetic resinous material substantially insoluble in organic solvents. No. 2,214,769. David Lipkin to The Atlantic Refining Company.
Composition of matter comprising soluble fusible aminoplast having incorporated therein an aminoester salt as accelerator of curing. No. 2,214,851. Gaetano F. D'Alelio to General Electric Company.
Process making casein products, comprising extruding alkaline casein solution into aqueous bath containing metaphosphoric acid to coagulate the casein. No. 2,215,137. Charles Schwartz to Hall Laboratories.
Thermoplastic molding composition comprising ethyl cellulose and as mold lubricant therefor, small proportion of neutral refined mineral oil. No. 2,214,250. Wm. W. Pedersen to The Dow Chemical Co.
Process preparing moldable resinous composition. No. 2,215,596. Fritz Seebach, to Union Carbide and Carbon Corp.
Homogeneous plastic composition comprising cellulose ester of a fatty acid and the polysulfone of allyl chloride. No. 2,215.601. Peter J. Wiezevich now by judicial change, Peter J. Gaylor and William J. Sparks to Standard Oil Development Co.
Method charging a mold with polyvinyl resin. No. 2,215,733. Donald L. Gibb and Richard D. Freeman to The Dow Chemical Co.
Extrusion mix comprising extrudable polyvinyl resin. No. 2.216.020. Birger W. Nordlander and Robert E. Burnett to General Electric Co.
Sulfurized polymers and plastics. No. 2,216,044. Joseph C. Patrick to Thiokol Corp.
Preparation of styrene copolymers in finely divided form. No. 2,216,094. Edgar C. Britton, Harry B. Marshall and Walter J. Le Fevre to The Dow Chemical Co.

Rubber

Apparatus for drying articles of rubber compositions. No. 2,213,303. John E. Cady to United States Rubber Co.
Crude rubber and method of making same. No. 2,213,321. John McGavack Leonia and Chester E. Linscott.
Process heating vulcanizable polymerized halogen-2-butadiene-1,3 composition in presence of member of class of maleic acid, maleic anhydride, phthalic acid, tetrahydro phthalic acid, tetra hydro phthalic anhydride, metallic maleates, and metallic phthalates. No. 2,213,954. Richard A. Crawford to the B. F. Goodrich Co.
Manufacture of hard rubber product. No. 2,214,182. Herman J. Schelhammer to American Hard Rubber Co.
Process vulcanizing rubber. No. 2,214,460. Marion W. Harman, to Monsanto Chem. Co., St. Louis.
Synthetic rubber composition including polymerized chloroprene and gasoline insoluble chlorinated paraffin wax, said composition having high resistance to swelling in gasoline. No. 21,572. Emil Ott to Hercules Powder Co.
Vulcanized polymerized chloroprene. No. 2,214,934. Emil Ott to Hercules Powder Company.
Method preserving rubber comprises treating with equimolecular reaction product of compound from group consisting of fatty acids, containing from 8 to 18 C. atoms in molecule and acid cholides of such fatty acids with poly hydroxy benzene compound. No. 2,215,142. Wm. D. Wolfe to Wingfoot Corp.
Preparation of copolymers of butadiene and vinylidene chloride. No. 2,215,379. Lorin B. Sebrell to Winfoot Corp.
Rubber softening agent consisting of a bituminous material and at least equal amount of saturated fatty acid of high molecular weight, in which fatty acid serves as activator of penetration for bituminous material. No. 2,215,382. Arthur E. Warner, to The C. P. Hall Company.
Rubber softening agent for absorption by rubber prior to milling comprising bituminous material and petroleum product in which petroleum product serves as activator of penetration for the bituminous material. No. 2,215,383. Arthur E. Warner to The C. P. Hall Co.
Method of making fiber-rubber products. No. 2,215,553. Clifford S. Johnson to United States Rubber Co.
Method coating base with stabilized uncoagulated non-acid latex composition containing non-volatile latex coagulant, heating to increase consistency of latex coating, and associating the thus coated base with second latex composition coagulable by coagulant in said first latex composition. No. 2,215,561. Stewart R. Ogilby to United States Rubber Co.
Method of forming rubber articles. No. 2,215,562. Stewart R. Ogilby to United States Rubber Co.
Process for coating fabrics with rubber. No. 2,215.563. Stewart R. Ogilby to United States Rubber Co.
Method hardening rubber and rubber-like materials comprises subjecting same to action of hardening agent comprising solution of an alkali metal fluoride in liquid hydrogen fluoride. No. 2,215,704. Elbert C. Ladd and Nicholas J. Rakas to Chrysler Corp.

Textiles

Treatment textile materials to increase affinity of regenerated cellulose for cotton dyes without saponifying cellulose esters. No. 2,211,872. Alex. James Wesson and George Holland Ellis to Celanese Corp. of America.
In production of fibers from artificial filaments, steps comprising applying disintegrating material of spaced intervals and subjecting said filaments to heat treatment which is sufficiently drastic that a pull on said filaments will rupture same. No. 2,211,920. Jean Marie Alibert to E. I. du Pont de Nemours & Co.
Assistants for the textile and related industries and their manufacture. No. 2,212,224. Fritz Becherer, to J. R. Geigy A. G.
Method lubricating textile by contacting with lubricant comprising ester of phthalic acid with monohydric alcohol and member of class of non-drying higher fatty acids and glycerides of non-drying higher fatty acids. No. 2,212,369. Alphons O. Jaeger, to American Cyanamid and Chemical Corp.
Process for forming films from synthetic linear polymers. No. 2,212,770. Henry D. Foster to E. I. du Pont de Nemours & Co.
In treatment of fiber-forming synthetic linear condensation polymers, step comprising rapidly chilling hot polymer with liquid having substantially no solvent action under conditions used. Fiber forming synthetic linear polyamide in form of shaped article having crystal aggregates whose average diameter is less than 2 microns. No. 2,212,772. George DeWitt Graves, to E. I. du Pont de Nemours & Co.
Manufacture of raw materials resembling crepe from artificial resins. No. 2,213,125. Emil Hubert and Herbert Rein to I. G. Farbenindustrie Aktiengesellschaft.
Process producing artificial threads containing nitrogen and sulfur. No. 2,213,129. Walter Maier, Jessnitz Anhalt, Gaston Plepp and Heinrich Fink to I. G. Farbenindustrie Aktiengesellschaft.
Wetting agent for use in alkaline mercerizing solutions. No. 2,213,139. Richard Huttenlocher to Zschimmer & Schwarz Chemische Fabrik Dolau.
Process treating textile materials with solution of paraffine derivative soap obtained by reacting non-gaseous paraffin hydrocarbon with gaseous SO_2 and Cl_2 and hydrolyzing resulting product with organic nitrogenous base. No. 2.213,360. William S. Calcott and Arthur L. Fox to E. I. du Pont de Nemours & Co.
Process reducing felting and shrinking tendencies of wool, comprising treating with nitrosyl chloride. No. 2,213,399. Mearl A. Kise to The Solvay Process Co.
Process softening textiles and synthetic fibers in aqueous bath containing condensation product of an alkylolamine and member of group of higher fatty acids, their esters and anhydrides and acid halides, which has been after treated with an alkylating agent. No. 2,213,673. Wolf Kritchevsky to Ninol, Inc.
Process preparing laminated sheet material comprising rubber and knitted fabric. No. 2.213.899. Francis G. Brown and David J. Sullivan to E. I. du Pont de Nemours & Co.
Artificial fiber suitable for yielding dyeings fast to fulling. No. 2.213,972. Arthur von Weinberg, Hanns Rein, Bad Homburg vor der Hohe, and Otto Eisenhut to I. G. Farbenindustrie Aktiengesellschaft.
Apparatus for producing a uniform silver of continuous rayon filaments. No. 2,215,112. Heinz van Beek. Ernst Worn, Karl Lohmann and Reinhard Jesse to Walther H. Duisberg.
Process producing color on artificial textile materials and foils. No. 2.215.196. Paul Schlack to General Aniline & Film Corp.

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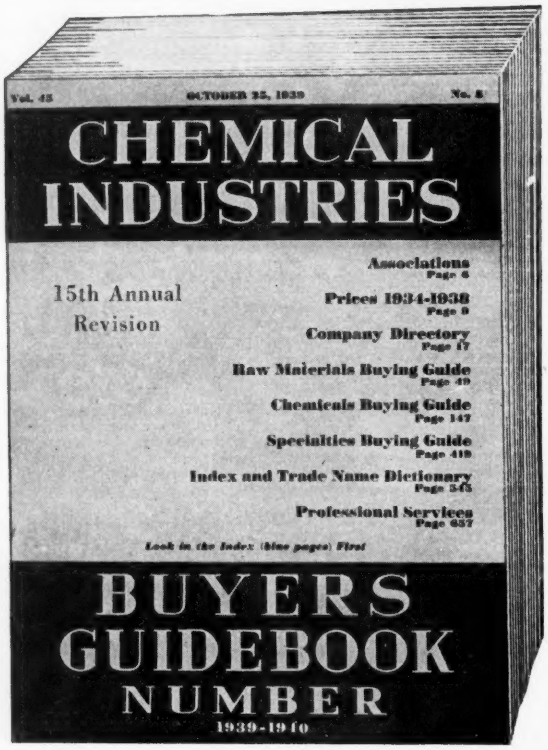

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Abstracts of Foreign Patents

Collected from Original Sources and Edited

By E. L. Luaces, Chemical and Patent Consultant

To assist those making use of this summary, it might be well to comment briefly on the system used by each of these countries in reporting patents.

Canada grants the patent on the date of publication. Printed copies are not obtainable, but typewritten certified copies may be obtained at a cost averaging about five dollars each.

English "patents" here reported are known as *Complete Specifications Accepted.* They are printed for distribution at a cost of 1s. 1d. each. They are subject to opposition by interested parties for a period of two months from date of publication.

French patents are granted several months before publication. Allowed applications are open to public inspection on payment of a fee, but no copies may be purchased nor notes made from the original. Printed copies of specifications are available to public several months after issue at 10 francs each, plus postage.

Belgian patents are granted several months before publication. No printed copies are available, but photostat copies may be obtained at a cost of from 3.5 to 4.5 francs per page.

In this digest the latest available data will be published as obtained from original sources. It will be readily understood that present conditions bring about delays in transportation and that for that reason the coverage will vary from month to month. We expect shortly to be able to begin publication of abstracts of German patents.

Present conditions make it impossible to obtain printed copies or photostats of French and Belgian patents, but this should shortly be corrected. We shall be glad to assist those interested in obtaining copies of Canadian and English patents. Your comments and criticism will be appreciated.

CANADIAN PATENTS

Granted and Published August 13, 1940

Apparatus for aging casked whiskey by heat and agitation. No. 390,623. Joseph P. Spang.

Preserving freshly cut logs by applying to their ends solution having osmotic action upon wood and containing sugar and a wetting or dispersing agent. No. 390,625. Charles G. Tenger.

Brazing alloy containing phosphorus, antimony and copper. No. 390,653. Canadian Westinghouse Company, Limited. (Philip R. Kalischer.)

Method of concentrating ores by flotation using a low viscosity sulfur oil containing alkyl sulfides. No. 390,662. General Chemical Company. (Bernard M. Carter.)

Process and apparatus for removing tin from lead. No. 390,655. Cerro de Pasco Copper Corporation. (Thomas E. Harper and Gustave Reinberg.)

Method of concentrating ores by flotation using a low viscosity sulfur oil containing alkyl sulfides. No. 390,663. General Chemical Company. (John R. Tuttle.)

Process for rendering cellulose-containing material crease-resistant. No. 390,671. Haberlein Patent Corporation. (George Haberlein, Jr., Ernst Weiss and Hans Hemmi.)

Wax containing monoacid ester of diethylene glycol, and a higher fatty acid. No. 390,676. Industrial Patents Corporation. (Clinton H. Parsons.)

Acid resist powder for etching including a resinaceous material comprising thermoplastic phenol-formaldehyde synthetic resin and a wax such as carnauba. No. 390,683. Mallinckrodt Chemical Works. (Donald B. Almutt.)

Manufacture of refractory metal composition comprising molybdenum or tungsten or their carbides, silver, and copper. No. 390,684. P. R. Mallory & Co., Inc. (Arnold S. Doty and Earl F. Swazy.)

Producing acetylated-methylcholine salts as reacting 1-dimethylamino-2-hydroxypropane with an aliphatic acid anhydride and treating resulting acyl ester thus obtained with alkylating agents. No. 390,685. Merck & Co., Inc. (Georg Roeder.)

Sintering or calcining apparatus. No. 390,706 and 390,707. F. L. Smidth & Co. (Nikolai Ahlmann.)

Apparatus for generating foam. No. 390,708. Standard Oil Development Company. (Radcliffe M. Urquhart and George G. Urquhart.)

Dehydration of organic hydroxy compounds as by heating an ester of an aliphatic hydroxy acid and adding thereto an acid salt of a polybasic acid. No. 390,728. Woburn Degreasing Company. (Kurt A. F. Pelikan, Donatus von Mikusch-Buchberg and Erich F. R. Schuelke.)

Introducing double bond into an aliphatic chain by heating to above 100° C. a sulfonation product of an aliphatic hydroxy compound in which the H of the —SO_3H group has been neutralized by an alkali. No. 390,729. Woburn Degreasing Company. (Kurt A. F. Uelikan, Donatus von Mikusch-Buchberg and Erich F. R. Schuelke.)

Process for producing a condensation product of an aldehyde with an aliphatic hydroxy compound. No. 390,733. Camille Dreyfus. (George W. Seymour and John L. Baggett.)

Granted and Published August 20, 1940

Manufacture of dustless solid or plastic metal powder aggregate. No. 390,764. Clarence P. Harris.

Laminating metal foil between paper sheets using casein as binder and treating with formaldehyde to make the binder water insoluble. No. 390,770. Gene R. Kruger.

Sound absorbing composition comprising mineral wool, asbestos, diatomite and a saponified sizing. No. 390,782. Kenneth S. Rankin.

Method and apparatus for manufacturing insulating board. No. 390,783. Mils Ryberg.

Dehydration of aqueous acetic acid by counter-current treatment with furfural in an extractor. No. 390,788. Theodore O. Wentworth.

Differential flotation of copper-zinc ores in which copper flotation takes place in presence of a small amount of a dithiophosphate promoter, the zinc in presence of a large proportion, and the lead in presence of a xanthate. No. 390,792. American Cyanamid Company. (Arvid E. Anderson and Norman Hedley.

Froth flotation in presence of a flotation collector and a frother containing a major proportion of alkylated phenols having side chains of at least two carbon atoms in length. No. 390,793. American Cyanamid Company. (Ludwig J. Chrismann and Davis W. Jayne, Jr.)

Blue print coating comprising a light-sensitive ferric salt, a soluble ferri-cyanide and a compound included in the group consisting of amidines and quaternary ammonium compounds. No. 390,794. American Cyanamid Company. (Garnet P. Ham.)

Method of reducing shrinkage of cellulosic textile fabrics on washing by impregnating with condensation product resin. No. 390,805. The Calico Printers' Association Limited. (Louis A. Lantz and Alexander L. Morrison.)

Process for producing chlorine-free, water-insoluble titanate pigments. No. 390,812. Canadian Industries Limited. (Gordon D. Patterson.)

One-stage process for converting alcohol to ether by passing alcohol vapors containing up to 15% water at temperatures between 150° and 300° C in absence of oxidizing gas over a catalyst. No. 390,822. Crima, S. A. (Armand Mastrangelo.)

Manufacture of printing inks by treating water wet filter press cake pulp containing around 70-85% water, with a wetting agent, and thereafter emulsifying the water coated pigment in an oily ink vehicle without separation of water. No. 2,390,827. General Printing Ink Corporation. (Joseph G. Curado.)

Process for preparing lithographic plates comprising applying a water-dispersible polymerized carboxylic acid product of viscosity 0.8 to 8.0 sec. No. 390,829. Harris-Seybold-Potter Company. (William H. Wood.)

Method of obtaining directly a soft ductile nickel plate of image reflective ability by electrolyzing a solution of plating salts and a formate at pH 5.5 to 2.5 and temperature between 90 and 190° F. No. 390,831. Houdaille-Hershey Corp. (Edwin M. Baker.)

Soldering flux comprising: petrolatum 70%, ammonium chloride 4.5%, zinc chloride 16.8%, stannous chloride 5%, and water 3.7%. No. 390,843. Mueller Brass Co. (Frank M. Levy.)

Process for the manufacture of pigmentary lead titanate. (No. 390,844. National Lead Company. (Helmut Espenschied.)

Process for the beneficiation of titaniferous ores. No. 390,845. National Lead Company. (Franklyn L. Kingsbury and William Grave.)

Process for the manufacture of titanium dioxide pigments using tungsten as reflectance controlling agent. No. 390,846. National Lead Company. (Willis F. Wasgburn, Roy Dahlstrom and Andrew T. McCord.)

Method for producing deep-drawn articles of sheet iron by electrolytical deposition on a stripping cathode. Nos. 390,849 to 390,851. incl. Plastic Metals, Inc. (John L. Young.)

Combining method using a polymerized aliphatic acid ester of vinyl alcohol as adhesive. No. 390,887. Carbide and Carbon Chemicals Corporation. (Joseph G. Davidson.)

Granted and Published August 27, 1940

Thermal dehydration of an aliphatic acid by subjecting its vapor to action of heat in presence of compound selected from partially amidated oxygen acids of phosphorous, and their esters. No. 390,907. Henry Dreyfus.

Thermal dehydration of an aliphatic acid by subjecting its vapor

Foreign Chemical Patents

Canadian, English and French—p. 33

to action of heat in presence of a completelyy amidated oxygen acid of phosphorus. No. 390,908. Henry Dreyfus.

Thermal dehydration of acetic acid by subjecting its vapor to action of heat in presence of phosphine, a tetraphosphonium compound or a triphosphine oxide. No. 390,909. Henry Dreyfus.

Method of rendering porous cellulosic matter non-permeable to water, alcohol, etc., by impregnating with terpin hydrate and triphenyl phosfate. No. 390,918. Christopher Luckhaupt.

Decolorizing palm oil by heating to 200-450° C. in a non-oxidizing atmosphere. No. 390,928. Francis M. Sullivan.

Froth flotation of an aqueous ore pulp with mixture of saturated and unsaturated aliphatic nitriles in which those having at least three and not over ten carbon atoms predominate. No. 390,933. Armour and Company. (James Harwood and William O. Pool.

Manufacturing paper felt by pulping paper in water to form gelatinized paper stock, disintegrating rags to fibres, mixing rag fibres with paper stock, and felting the furnish. No. 390,934. The Barrett Company. (Roger B. Brown.)

Catalytic vapor phase condensation process comprising passing a non-benzenoid polymerizable polymer of acetylene and gas selected from ammonia and volatile primary amines over acetylene ammonia condensation catalyst at an elevated temperature. No. 390,938. Canadian Industries Limited. (Albert S. Carter.)

Processing of ammonium nitrate explosive. No. 390,939. Canadian Industries Limited. (William E. Kirst.)

Production of secondary alkyl monosulfonates. No. 390,940. Canadian Industries Limited. (James H. Werntz.)

Method of producing a thermoplastic derivative of rubber. No. 390,941. Canadian Industries Limited. (Ira Williams.)

Fertilizer prepared by heating a mixture of urea and peat to temperature between about 190° and about 250° C. No. 390,951. The Dow Chemical Company. (John W. Corey.)

Fire-retardant composition comprising non-volatile organic combustible material impregnated with a fire-retardant such as ammonium sulfamate. No. 390,952. E. I. du Pont de Nemours & Co., Inc. (Martin E. Cupery.)

* *Canadian Patents Granted and Published August 27, 1940, will be continued next month.*

ENGLISH COMPLETE SPECIFICATIONS

Accepted and Published June 26, 1940

Manufacture of coated paper. No. 522,196. K-C-M Co.

Pretreated bearing surfaces and method of producing same. No. 522,199. Standard Oil Co. of California.

Process for the manufacture of catalyst. No. 522,409. Universal Oil Products Co.

Textile oils. No. 522,151. N. V. de Bataafsche Petroleum Mij.

Photographic films. No. 522,161. E. I. du Pont de Nemours & Co., Inc.

Manufacture of austenitic ferrous-alloy articles. No. 522,252. Bristol Aeroplane Co., Ltd.

Rendering textiles, paper, leather, furst, etc., water-repellent. No. 522,204. Deutsche Hydroerwerke A. G.

Removing scale from metal. No. 522,177. Alloy Research Corporation.

Process for working up residues of the hydrogenation under pressure of distillable carbonaceous material. No. 522,254. N. V. Internationale Hydrogeneeringsoctrooien Mij.

Method of producing hydrated calcium silicate minerals and products thereof. No. 522,271. Gypsum, Lime & Alabastine, Canada, Ltd.

Manufacture of solid molecular compounds of alkylxanthines. No. 522,274. I. G. Farbenindustrie A. G.

Preparation of lead sulfate products particularly adapted for use as pigments. No. 522,362. National Lead Company.

Production of glutamic acid and its salts. No. 522,365. Corn Products Mfg. Co.

Preparation of cyclic hydrocarbons from aliphatic hydrocarbons. No. 522,366. N. V. de Bataafsche Petroleum Mij.

Separation of the constituents of coal. No. 522,367. M. F. Bertrand.

Protecting articles made of magnesium or its alloys. No. 522,382. J. Fransch.

Manufacture of chlorosulfonates. No. 522,209. E. I. du Pont de Nemours & Co., Inc.

Process and apparatus for applying adhesive. No. 522,210. Imperial Chemical Industries Limited.

Method of and apparatus for treating and disposing of fecal matter and vegetable or like refuse. No. 522,213. Mills & Co. (Engineers), Ltd., et al.

Manufacture of aliphatic ketone-diarylamine. No. 522,401. United States Rubber Products, Inc.

Surface treatment of aluminum and its alloys, and the after-treatment of anodic films thereon. No. 522,214. British Aluminum Co., Ltd., et al.

Artificial leather-like products and their production. No. 522,220. W., H., O., and R. Freudenberg.

Coloring matters of the phthalocyanine series. No. 522,293. Imperial Chemical Industries Limited.

Boiler installation for waste heat recovery. No. 522,223. E. F. Spanner.

Apparatus for separating liquids. No. 522,316. Espley & Co., et al.

Alkaloids of species of erythrina and processes of production. No. 522,225. Merck & Co., Inc.

Preparation of chloramines. No. 522,404. Wessanen's Koninklijke Fabrieken N. V.

Manufacture of olefine oxides. No. 522,234. Distillers Co., Ltd.

Corrosion inhibitors. No. 522,235. United States Rubber Products, Inc.

Apparatus for loading material onto belt conveyors. No. 522,236. Mavor & Coulston, Ltd.

Method and apparatus for manufacture of rayon. No. 522,347. Skenandoa Rayon Corporation.

Process of reclaiming rubber. No. 522,183. United States Rubber Products, Inc.

Lubricating compositions. No. 522,191. United States Rubber Products, Inc.

Process for the manufacture of catalysts. Nos. 522,410 and 522,411. Universal Oil Products Company.

Accepted and Published July 3, 1940

Method and apparatus for agglomerating or briquetting fuels. No. 522,515. V. H. A. Syndicate, Ltd., et al.

Apparatus for protection against poison gas. No. 522,516. F. Heaton and A. H. Windridge.

Manufacture of nitrided steel articles. No. 522,475. Bristol Aeroplane Co., Ltd., et al.

Production of copper-base alloys. No. 522,482. Mallory Metallurgical Products, Ltd.

Method of softening water. No. 522,430. E. Zentner.

Methods of protectively coating mirror films. No. 522,446. Peacock Laboratories, Inc.

Removing acid components from hydrocarbons. No. 522,450. N. V. de Bataafsche Petroleum Mij.

Recovery of hydrocarbons from mineral oil acid-refining wastes. No. 522,451. Galicyjskie Towarzystwo Naftowe Galicja Sp. Akc. *et al.*

Adhesion of rubber and the like to textile materials. No. 522,568. Dunlop Rubber Co., Ltd.

Electrolytic production of protective coatings on aluminum. No. 522,571. J. Frasch.

Production of colored artificial materials. No. 522,591. British Celanese, Ltd.

Treatment of mineral oils with solvents. No. 522,605. Standard Oli Development Company.

Preparation of 2-methyl-5-chlor-methyl-6-amino pyrimidine hydrochloride. No. 522,531. Merck & Co., Inc.

Production of resinous condensation products. No. 522,494. Beck, Koller & Co. (England), Ltd.

Enhancing and fastness to water of dyeing on textiles. No. 522,539. I. G. Farbenindustrie A. G.

Production of celulose meal. No. 522,614. W. Herbst.

Manufacture of crimped artificial textile filaments. No. 522,542. Comptoir des Textiles Artificiels.

Manufacture of ruby glass. No. 522,634. E. I. du Pont de Nemours & Co., Ins.

Manufacture of alkali metals by electrolysis. No. 522,635. E. I. du Pont de Nemours & Co., Inc.

Manufacture of combustible gas and coke from carbonaceous materials. No. 522,640. Institution of Gas Engineers, *et al.*

Production of derivatives of urea. No. 522,643. E. I. du Pont de Nemours & Co.,

Coagulation of cuprammonium cellulose solutions. No. 522,645. I. G. Farbenindustrie A. G.

Manufacture of aqueous solutions having a high calcium content. No. 522,646. I. G. Farbenindustrie A. G.

Production of phenol-aldehyde synthetic resins. No. 522,647. I. G. Farbenindustrie A. G.

Manufacture of vat dyestuffs. No. 522,657. Society of Chemical Industry in Basle.

Manufacture of nitrogenous naphthalene derivatives. No. 522,658. Society of Chemical Industry in Basle.

Stabilization of rubber hydrohalides. No. 522,659. Imperial Chemical Industries, Limited.

Polymerization of butadienes-1.3. No. 522,665. I. G. Farbenindustrie A. G.

Removing acid components from hydrocarbons. No. 522,559. N. V. de Bataafsche Petroleum Mij.

Manufacture of chromium and its alloys. No. 522,561. M. J. Udy.

production of copper base alloys. No. 522,513. Mallory Metallurgical Products, Ltd.

FRENCH PATENTS

Granted December 16, 1939; Published December 21, 1939

Improved process for protecting metal articles against corrosion. No. 853,816. S. A. des Hauts-Forneaux et Fonderies de Pont-a-Mousson.

Improved process for the manufacture of glass tubes in a continuous manner. No. 853,872. Cies. Réunies des Glaces et Verres Speciaux du Nord de la France.

Improved process for refining petroleum derivatives. No. 853,758. Pecana, S. A.

Process for transforming hydrocarbons and other bodies by means of atomic hydrogen. No. 853,782.

Condensation product and means for its manufacture. No. 853,845. I. G. Farbenindustrie A. G.

Granted December 23, 1939; Published December 28, 1939

Apparatus for coating textile filaments. No. 853,930. G. Gindre.

Improvements in portable safety lamps for mines. No. 853,977. Téléphones Le Las, S. A.

Improvements in converters for the treatment of metals. No. 853,939. Société des Aciéries de Longwy.

Processes and apparatus for distillation of zinc. No. 853,995. P. Arbez.

Process for dry forming of dolomite refractory bricks. No. 853,889. S. A. des Hauts-Forneaux de la Chiers.

New organo-metallic compound, alloy, process for manufacture, and applications. No. 853,978. Société d'Electrochimie, d'Electrométallurgie et des Aciéries Electriques d'Ugine.

Improvements in industrial production of ketones. No. 854,000. P. Naldi.

Preparation of water-soluble products and products which result. No. 853,940. Ets. Kuhlmann.

Granted January 2, 1940; Published January 4, 1940

Improvement in the industrial use of radioactive substances or compositions. No. 854,094. Ets. Polyradia.

Preparation of 1,1,4-trimethyl-cycloheptenyl-3-formic-5 aldehyde. No. 854,038. L. Givaudan & Cie. (S. A.)

Production of isobutylene and its dimer. No. 854,042. A. C. Jessup.

Reduction of sulfurous oxide to sulfur. No. 854,116. F. W. De Jahn.

Cracking process. No. 854,041. A. C. Jessup.

Production of cellular rubber having closed cells. No. 854,051. Société Franco-Belbe du Caoutchouc Mousse.

Recovery of alcohol from fermentation vats. No. 854,060. G. L. R. Ducellier and M. A. Isman.

Polymerization process. No. 854,115. Manufacture des Glaces et Produits Chimiques de Saint-Gobian, Chauny et Cirey.

Improvements in processes of carbonization and distillation of solid combustibles. No. 854,017. E. J. M. Lecoq and J. L. M. Rabu.

Improved operation of water-gas apparatus. No. 854,091. Société Rateau.

Filter for antigas protectors. No. 854,008. E. Larcher.